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In the Supreme Court of the United States

OCTOBER TERM, 1948.

Nos. 184 and 185.

GRAVER TANK & MFG. CO., INC.,
THE LINCOLN ELECTRIC COMPANY,
GRAVER TANK & MFG. CORPORATION,
Petitioners,

vs.

THE LINDE AIR PRODUCTS COMPANY,
Respondent.

ON WRITS OF CERTIORARI TO COURT OF APPEALS
FOR SEVENTH CIRCUIT.

PETITIONERS' BRIEF.

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December 9, 1948.

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On Writs of Certiorari to Court of Appeals
For Seventh Circuit.

PETITIONERS' BRIEF.

This is a patent case.

It brings for review upon writs of certiorari two judgments of the Court of Appeals for the Seventh Circuit.

The judgments relate to United States Letters Patent No. 2,043,960 (R. 955), issued to Lloyd Theodore Jones, et al., for a process of electric welding and fluxes or compositions for use therewith.

The judgments were entered (R. 1004-5) upon appeals separately taken by petitioners and respondent (R. 931, 935) from the judgment of the District Court of the United States for the Northern District of Indiana, Hammond Division (R. 929).

The action in the District Court was brought by respondent, The Linde Air Products Company, as owner of the patent, charging infringement by Lincoln and the Graver companies (R. 14).

In the trial court the bulk of the patent was held invalid; four flux claims were held valid and infringed (R. 907), 75 USPQ 231. The Court of Appeals held all of the claims valid, and affirmed as to those held infringed (R. 990), 167 F. (2d) 531.

Specifically, the Court of Appeals:

1. Reversing the trial court, held valid all of the claims of the patent relating to a process of electric welding, i.e., claims 1 through 9 and 11 through 17; claim 10 was not in suit. The trial court had held all of these claims invalid.
2. Reversing the trial court, held valid certain of the claims to a flux for use in the process, i.e., claims 24, 26, and 27. The trial court had held these claims invalid.
3. Affirming the trial court, held valid and infringed certain other flux claims, i.e., claims 18, 20, 22, and 23; the remaining flux claims, 19, 21, 25, 28, 29, were not in issue.
4. Affirming the trial court, held respondent had not misused the patent by binding licensees to purchase from respondent Linde their entire requirements of unpatented welding electrodes for use in the process.

The judgments below, although separate, arise out of a single suit, relate to a single patent, and in each of the courts below issued upon a single opinion. They were brought here by one petition, separately filed in each case, and similarly will be dealt with now in one brief.

OPINIONS BELOW.

The opinion of the District Court (R. 907) is reported in 75 USPQ 231.

The opinion of the Court of Appeals for the Seventh Circuit (R. 990) is reported in 167 F. (2d) 531. Petition for rehearing (R. 1006) was denied without opinion on May 14, 1948 (R. 1034).

JURISDICTION.

This Court has jurisdiction to review the judgments in question under Section 240(a) of the Judicial Code as amended by the Act of February 13, 1925, 28 U. S. C. 347(a), which was in effect when the petition for writs of certiorari was filed, and which now is Section 1254(1) of the new Federal Judicial Code, 28 U. S. C. 1254(1).

STATEMENT OF FACTS.

The Jones patent in suit (R. 955), owned by respondent, The Linde Air Products Company, by assignment from its parent, Union Carbide & Carbon Corporation, covers a claimed new process of electric welding and compositions or fluxes for use therein.[1]

The action brought by the patent owner Linde charges infringement by Lincoln, a manufacturer of electric arc welding equipment and supplies, and the Graver companies, users of Lincoln materials (R. 14-5).

Basically the controversy is this:

1. Can the process claims of the patent in suit (R. 955), be held valid and so made the basis of a charge of infringement by the Lincolnweld process

[1] Excerpts from the patent are set forth in the appendix. All claims are in issue except process claim 10 and flux claims 19, 21, 25, 28, 29 (R. 17). It is not claimed these are infringed. They define the specific composition found by the patentees to be useful and on which respondent's entire "commercial success" is based (R. 908, 925, Finding 9).

of electric arc welding developed under the teaching of the prior J. C. Lincoln patent No. 1,589,017 (R. 961), now expired, and licensed under the Robinoff patent No. 1,782,316 (R. 975), likewise now expired? The District Court held all of the process claims invalid (R. 907). Accordingly, it did not reach the question of infringement. The Court of Appeals, reversing, held these claims valid (R. 990).

2. Does the Lincolnweld flux, used in electric arc welding, which follows the prior and now expired Miller patent No. 1,754,566 (R. 969), infringe the flux claims of the patent in suit? The District Court held certain of the flux claims invalid; others it held valid and infringed (R. 907). The Court of Appeals held all of the claims valid. Accordingly, it reversed as to the claims held invalid, and affirmed as to the claims held infringed (R. 990).

The result of what the Court of Appeals has done is to regrant to respondent Linde the expired Lincoln, Robinoff, and Miller patents. By law those patents are in the public domain, but under the judgments below no one can practice those patents without infringing the expanded Jones.

Electric Welding.

To see how these expired patents have been reclaimed from the public domain and handed over to respondent, it is important to bear in mind certain facts about the process of welding steel. What occurs is that the pieces to be joined are melted at their adjoining edges and thus are merged, usually with additional fused metal deposited from a welding rod or electrode, to form a single piece (R. 439). Two basic problems are involved: One is to provide the necessary heat; the other is to protect the metal, while molten, from contact with the air (R. 171).

—Use of Electric Arc Is Old.

The *first* problem is to provide the heat. For this the electric arc has supplied the answer. It has been utilized, for welding purposes, for more than 50 years (R. 439-40).

In this process, using the electric arc for the source of heat, the electric current traverses a gaseous space between an electrode and the plates to be welded (R. 66, 236, 597-8). Bridging the gap between the metal electrode and the metal work piece, the arc attains temperatures described as the highest known in practical application prior to atomic fission (R. 238-9, 244, 440). In no other way can such enormous heat be developed in so small a space (R. 243-4). The heat is so intense that it vaporizes part of the steel itself to form part of the ionized gaseous conductor which carries the current and forms the arc (R. 597-8). The heat so developed melts the electrode and the edges of the adjoining plates. The metal so melted, including the metal of the electrode, coalesces to form a solid seam (R. 439).

If, however, the gap or space between the end of the electrode and the work piece is occupied by a solid or liquid substance which acts as a resistor to the flow of the current and thereby produces heat, no arc can be present (R. 595, 600-1, 742). It is here that the patentees of the Jones patent in suit claim to have made their contribution. They substitute, so they say, in place of the arc, a molten pool of "conductive melt or welding composition having appropriate electrical resistance properties" which, acting as a resistor, "provides heating means" (see patent in suit, R. 956, col. 1, lines 28-35).

This process, according to their patent, avoids the arc of conventional methods. The trial court, however, found that such arcless process "does not in point of fact exist" (R. 915).

The reviewing court did not reject this finding; it escaped the consequences of the finding by an erroneous ruling of law, as shortly will be demonstrated. For the

moment the point to bear in mind is that for the arc as the heating instrumentality the inventors claim to have found a novel substitute.

—Flux Protection Likewise Old.

The *second* problem is to protect the molten metal. While the metal is molten it must be kept from contact with the air (R. 170-3, 447, 735, 898). There are two reasons for this:

Molten metal if exposed to air, will oxidize (R. 170-3). As the familiar example of the high school chemistry laboratory will recall, a wire, turned red hot over a Bunsen burner, if plunged into a flask of oxygen, will burn. The same thing would happen to steel, at arc temperatures, if exposed to oxygen, and much the same happens upon exposure to air, except that, since the normal atmosphere contains but 20% oxygen, the burning action is slower (R. 172). An equivalent is to be found in the rusting of unprotected metal exposed to air and the results are essentially the same. However, at the elevated temperatures of the arc, this "rusting," or oxidation, if allowed to occur, would proceed at a tremendously rapid rate (R. 171). The result, because of the chemical and physical reactions involved, would be a weld brittle, porous, and wanting in tensile strength (R. 172).

The other reason is that the molten metal if exposed to air will produce a reaction between the carbon which is in all steel and the oxygen in the air (R. 58). The carbon of the steel, joining with the oxygen of the air, forms a gas which, trapped in the metal, shows up as a bubble or hole (R. 57-8, 459). This reaction, if allowed to occur, would produce porosity, or holes, in the hardened metal (R. 459).

These problems, encountered in welding (R. 170-3), are the same problems as are met in steel making, or in any other metallurgical operation which reduces metal to a molten state. The metal, while molten, must be kept from

contact with the air. To accomplish this the steel industry "for generations" has used a method of blanketing the metal with a molten slag or flux (R. 447) which, like oil on water, floats on top as a protecting mantle.

For this purpose calcium and magnesium silicates, or the components thereof which at furnace temperature form such silicates,[2] have been regularly employed. Thus in the case of electric furnaces in which the electric arc is used as the heating instrumentality in a manner closely analogous to electric arc welding, as far back at 1903, Heroult (patent No. 720,703, Defts. Exh. 143, R. 720, 1329-30) used a flux composed chiefly of "lime [calcium oxide], dolomite [calcium-magnesium carbonate], or oxid of iron liquefied by the addition of silica,"—i.e. calcium magnesium or iron silicate—or, alternatively, of "a fusible silicate which has no chemical action on the bath." For similar use Greene (patent No. 1,532,052, Defts. Exh. 143, R. 720, 1331-4) disclosed a flux consisting of lime, i.e. calcium oxide, and a substantial percentage of silica—in other words, calcium silicate.

The close analogy between the electric furnace, which utilizes the arc in processing metal, and electric arc welding (R. 461) was recognized by Robinoff when, urging that a patent be sought upon his process, he wrote to his superior:

> "Our process resembles very much the methods used in producing steel in electric furnaces. * * * We believe that our method of welding should be called 'Portable electric furnace welding method.'

---

[2] There "are many silicates in nature" (R. 304, 642). Silicates may be produced by applying the heat of an electric or other furnace or heating medium to the component oxides. "These * * * basic oxides, calcium, magnesium, manganese and alumina, when combined with silica" form silicates (R. 263). "These oxides then are fused with silica * * * and in that way we get a silicate of whatever metals were used originally" (R. 264).

"* * * The slag protects the metal from coming in contact with air and all its damaging effects upon the quality of the deposited metal" (Pltf. Exh. 227, R. 543, 897, 898).

Identically the same, as well as many other, metallic silicates, which have thus been used in electric furnace operation, have likewise long been used in electric arc welding to provide a protective flux or slag covering for the molten metal. Furthermore, the desirability of prefusing the ingredients so that all reactions which would evolve deleterious amounts of gases during welding will be substantially completed was likewise old and well known prior to the advent of Jones in the field of electric welding.[3]

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[3] See, for example, the following patents covering fluxes for use in electric arc welding, issued in the years 1912 to 1930, many of which had expired when the present patentees appeared upon the scene:

Strohmenger No. 1,041,525 (Defts. Exh. 144, R. 720, 1336) which disclosed use of the silicates of sodium, aluminum and iron (p. 1, lines 54-64) as to which it was said "The fused covering acts as a flux and prevents the molten metal coming in contact with the air, thus preventing porosity" (p. 1, lines 70-78).

Armstrong No. 1,241,899 (Defts. Exh. 144, R. 720, 1338-9) which disclosed the use of "sodium silicate, aluminum silicate [i.e., clay]" (p. 1, lines 59-73; p. 2, lines 16-83).

Pescatore No. 1,277,639 (Defts. Exh. 144, R. 720, 1341-2) calling for a "slag-forming material * * * of * * * calcium and iron silicate, or of blast furnace slag" (p. 2, lines 18-24).

Jones No. 1,441,685 (Defts. Exh. 144, R. 720, 1344) calling for lime and silica, i.e., calcium silicate (p. 1, lines 49-58).

Armor No. 1,467,825 (Defts. Exh. 145, R. 720, 1346), which taught prefusion of the ingredients, forming silicates of aluminum, iron and manganese (col. 1, lines 43-7).

Miller No. 1,741,031 (Defts. Exh. 145, R. 720, 1347-8), which taught the flux "should not evolve such quantities of gases, as by decomposition of its constituents or reaction among them, that the flux puffs or froths away from the surface of the molten metal" (p. 1, lines 85-18) and disclosed that "If a preformed [that is, prefused] glass

(Continued on following page)

—In Hand Welding.

In hand methods of arc welding, using a short length of steel electrode, the flux generally is placed on the electrode as a coating (R. 442). The heat of the arc vaporizes and melts this flux, producing a protective medium for the arc zone and a resultant molten layer floating on the molten weld metal (R. 116). Various combinations of ingredients, particularly silicates, have long been used for this purpose, and many patents have been issued on such welding fluxes (R. 724-34, Defts. Exhs. 144, 145, R. 720, 969, 1335-54).

In addition to silicates, combustible materials producing inert gases for the additional protection of the arc zone have also been employed (R. 444). But whether gas producing materials or stable compounds such as silicates are used, the object is the same. It is to keep the air away from the welding zone and from the molten metal.

In Automatic Welding.

In automatic methods of arc welding, where a continuous electrode, in the form of a wire fed from a reel, is used, instead of supplying the flux as a coating on the electrode, it has been found preferable to lay the flux along the seam to be welded, or, alternatively, to surround the welding zone with an inert gas (R. 448). The now expired

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(Continued from preceding page)

[a silicate] is used it evolves no gases upon heating, while if the glass is formed in situ the reacting materials can be such that gases are not evolved" (p. 1, lines 75-8). The patent taught also that "The alkaline earth oxides may replace the alkali metal oxides in whole or in part" (p. 2, lines 8-11).

Miller No. 1,748,785 (Defts. Exh. 145, R. 720, 1349-50), which taught prefusion of ingredients. It directed "fusing together from 2 to 4 parts of ordinary borax and one part of silica, both materials being preferably in a finely divided form and thoroughly mixed before fusion. The fusion of the two substances is desirably continued until a homogeneous melt results" (p. 1, lines 37-53).

Miller No. 1,754,566 (Defts. Exh. 145, R. 720, 969) which called for manganese silicate (R. 969, lines 27-8, 53-64).

J. C. Lincoln patent No. 1,589,017 taught both[4] (Defts. Exh. 101, R. 458, 961).

What Robinoff taught was an improvement consisting in the use of a deep layer of flux under which the welding operation takes place (R. 493-4, Defts. Exh. 108, R. 766, 901, Defts. Exh. 103, R. 460, 975). In this process the flux is laid on the seam in a deep layer, or is fed onto it ahead of the arc so as to submerge the arc in the compound (R. 493-4, 504, 737, 927). This process was described by one of the executives of Western Pipe & Steel Co., where the process was in use and where the present patentees began their experiments, as follows:

> "The pipe, which is 30' long, travels through under the arc and a flux is deposited on the joint to be welded to a depth of approximately 1½" and 2" wide, of a convex shape, and the welding wire feeding thru a stationary head [the welding machine] cuts through the flux, *entirely covering the arc* from the atmosphere * * *"[5] (Pltf. Exh. 128, R. 31, 879).

Kennedy, one of the inventors of the patent in suit, in the initial application similarly described submerged arc welding exemplified by Robinoff (Pltf. Exh. 123, R. 26, 1043). He said:

> "The process is such that the operator cannot see the progress of the weld, the *arc being submerged* in the fluxing material" (R. 1045).

This is shown in the photograph on the facing page (Pltf. Exh. 188AA, R. 215) taken during the demonstration

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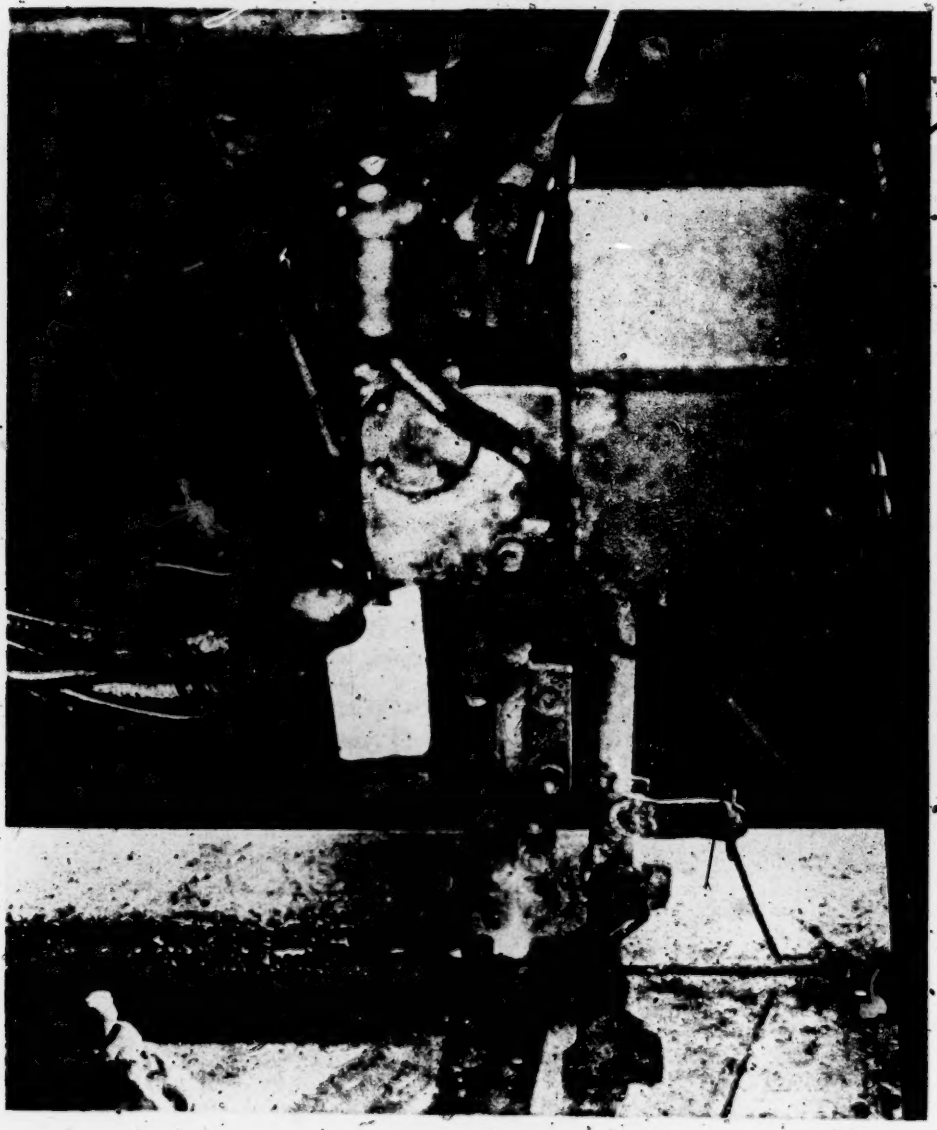
[4] Lincoln in his patent claimed (Defts. Exh. 101, R. 458, 961, 966-7):

> "1. The method of arc-welding, which consists in surrounding the molten metal with an inert medium during the welding operations * * *."
>
> 15. The method of welding, which consists in enveloping the heating flame in an inert medium and maintaining the molten metal producing the welded seam beneath an inert gas and a slag covering during the welding operation * * *."

[5] Emphasis and bracketed material supplied throughout.

DEMONSTRATION OF LINCOLNWELD PROCESS
(Pltf. Exh. 188AA, R. 215),



Note that the wire electrode feeds from the top down through the jaws of the electrode holder; flux feeds down from the box (upper right) onto the seam, ahead of the arc, as it traverses the seam from left to right, leaving a blanket of flux over the welded portion of the seam (to the left of the arc).

of the Lincolnweld process at the Graver plant (R. 214). It illustrates the teachings of Robinoff[6] under which both Lincoln and Linde were licensed.

These methods of protecting the weld metal have had wide application. At least a half million tons of coated electrodes, embodying these methods of blanketing the weld metal, are produced annually. They have been made in quantity for more than 20 years in all parts of the world (R. 442-3). Over 1,000 miles of welded pipe had been produced by the Robinoff submerged arc process in the National Tube Company's Christy Park Mill prior to the advent of Jones (R. 521).

In the Lincolnweld process, and in every other, including that practiced by Linde, the same methods of protecting the weld metal have at all times been used.

Robinoff, long prior to the patent in suit, utilized an unpatented flux consisting of 89% clay (R. 507), mainly aluminum silicate (R. 310); Lincoln used *manganese* silicate taught by the prior Miller patent.[7] Jones used a combination of calcium and *magnesium* silicates, but in the patent claimed in addition all the alkaline earth metal silicates,[8] and by the judgments in review has now been

---

[6] Robinoff claimed (Defts. Exh. 103, R. 460, 974, 977):

"8. In a method of seam welding the steps of first forming a groove along the seam to be welded, then depositing a body of flux in said groove, and then moving a metal electrode along said groove and drawing an arc causing said flux to melt and melting said electrode so as to deposit the molten metal from said electrode through said melted flux."

[7] Miller claimed (Defts. Exh. 145, R. 720, 969, 971):

"The process of welding ferrous metals which comprises fusing the metal and depositing the same under a molten slag containing *manganese silicate* . . ."

[8] These are the silicates of "calcium, magnesium, strontium and barium" (R. 925, Finding 11). It should be noted that while *magnesium* silicate which Jones used is an alkaline earth metal silicate, the *manganese* silicate which Lincoln used is not an alkaline earth metal silicate (R. 925, Findings 10, 11).

given both Robinoff's unpatented aluminum silicate and Miller's manganese silicate.

At the outset what the inventors of the patent in suit sought was a new and better flux (R. 908, 912). What it led to will next be pointed out.

Patent in Suit.

The inventors had no other aim than to produce a better flux for use with the old and well-known Robinoff method of submerged arc welding (R. 908, 912). They tried many combinations of silicates and finally compounded one which produced improved results (R. 39, 912). They conceived their discovery as consisting primarily of a new flux. This is evident from the initial patent application (Pltf. Exh. 125, R. 26, 1043). Out of 21 claims (R. 1052-4) ten related to:

"a fluxing material for electric arc welding"

and three to methods of producing the flux. However, they laid claim also to a new process of welding. But they did not claim it to be the arcless process on which, as will be seen, the patent ultimately issued.

Process Claims of Patent in Suit.

With limited knowledge of the teaching of the Robinoff patent on submerged arc welding (R. 77, 697) and none of the prior art use of fluxes comprised of silicates[9] (R. 60), the inventors applied for a patent on "submerged arc welding" and on all salts and silicates as fluxes (R. 71-2, 90, 417, 802, 909, original application, Pltf. Exh. 125, R. 26,

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[9] "Q. Were you not familiar with the use of slags as welding fluxes years before that?

A. I had never heard of any welding fluxes in electric welding * * * Our experience in electric welding had been limited to bare wire welding, and we know nothing whatever about electric welding fluxes" (R. 60).

1043, 1045, 1047, 1052-4, 1062, 1068). The invention was said to relate to:

> "a method of *electric arc welding in deep flux*, and also to the flux employed" (R. 1045).

—Arc Initially Claimed.

The application made to the Patent Office claimed the arc as the heating instrumentality. As the trial court noted, the application was "replete with references to the presence and use of an electric arc" (R. 909). Thus, in original claim 16 what the patentees sought to patent was:

> "A method of electric arc welding in the presence of a flux which consists in substantially *enclosing the arc in a flux* which has been rendered chemically inactive" (R. 75; Pltf. Exh. 125, R. 26, 1043, 1054).

The invention was described as "a new method, designated as *submerged-arc* electric welding" (R. 71, 1046). In all but two out of 21 claims the "arc" or "electric arc" was referred to (R. 72).

The Patent Office thereupon cited the prior Robinoff patent and others (R. 75, Pltf. Exh. 125, R. 26, 1043, 1056). At that stage respondent's parent, Union Carbide and Carbon Corporation, bought the patent application (R. 77). Its house patent solicitors took over the further prosecution of the application (R. 78, Pltf. Exh. 125, R. 26, 1043, 1060). The Robinoff patent, which admittedly involved the use of the submerged arc (R. 908, 912), having been cited, a second and then a third application were filed (R. 71, 78, 82, 84, Pltf. Exh. 126, R. 26, 1074, Pltf. Exh. 127, R. 26, 1103). The initial application, written by one of the inventors, was, he said (R. 30), "edited and changed" in the later applications. "I was responsible for the first application and the modifications are from our patent counsel" (R. 30), said Kennedy, one of the inventors.

In the "modifications" the electric arc, which, until Robinoff was cited, had been claimed as the heating medium, became a "conductive melt" (R. 79, 83-5).

Until this "revision" by Union Carbide's house counsel, the process had been considered by everyone to be an arc process. Note that:

In their experimental notes the inventors referred to the process throughout as "*arc* welding" (R. 90).

When the patentees, prior to the appearance of Linde, negotiated for sale of their invention to Western Pipe & Steel Co., a deal which proved abortive, the draft of the agreement drawn by Jones, one of the inventors (R. 138), asserted the "metal is deposited by the use of an alternating current *arc*" (Defts. Exh. 89, R. 65, p. 2, paragraph 3).

R. E. Cornwell, Linde's principal executive in charge of negotiations for the purchase of the patent, reported to his superior, Mr. Critchett, not upon a molten pool of "conductive melt" as the source of heat, but upon the "arc" (Defts. Exh. 93, R. 425, 73-4, 415-6), and told F. S. Warzeski, another superior:

> "The welding operation is conducted with a submerged arc, or in other words, the *arc is submerged in the deep flux*" (Defts. Exh. 94, R. 425, 417-8).

When Linde's parent bought the invention, what the contract said it covered was:

> "a method of electric *arc* welding, including a flux therefor" (Defts. Exh. 99, R. 425, 422).

However, the process so described would not produce a patent. Robinoff and others stood in the way.

—Arc Then Denounced to Distinguish Robinoff.

A new application was prepared by Union Carbide's house patent solicitors. In it the Patent Office was assured:

> "We have discovered a novel process of welding which resembles the arc process in many ways but which is essentially different from all arc processes and

uses no arc. As in prior processes the necessary heat is generated in our process by causing a heavy electrical current to flow across a region of relatively high electrical resistance, and thence to a member onto which metal is to be deposited, but in our process the resistance is provided, not by a body of ionized gas [i.e., not by an arc], but by a conductive melt" (R. 83, Pltf. Exh. 126, R. 26, 1074, 1078, second application).

Later this was amended to further disavow the arc by saying the process does *not* use "an arc of the usual type" (R. 130, Pltf. Exh. 126, R. 26, 1074, 1081-2, second application), and to emphasize the differences from the conventional arc process, the invention described in the first application as:

"a fluxing material for electric arc welding" (Pltf. Exh. 125, R. 26, 1043, 1052-4),

became in the second application:

"A *resistive composition* for electric welding which is conductive when fused [i.e., when molten]" (Pltf. Exh. 126, R. 26, 1074, 1078-81, 1083-4).

Thus was a radical departure devised upon which it was calculated the new owners would "have no difficulty in obtaining a strong patent" (Pltfs. Exh. 158, R. 133, 884, 885), and "getting our money out of it quickly" (Defts. Exh. 95, 425, 418).

For the "submerged arc" of the first application, there was substituted the "resistive composition" of the second which, in lieu of the arc, it was said, supplies "the necessary heat" (Pltf. Exh. 126, R. 26, 1074, 1078, 1082).

As R. E. Cornwell, Linde's principal executive in charge of the patent, in forwarding the second application to J. B. Hirst, his superior, for execution by the patentees, put it:

"You will note that the welding process has been defined as a process *entirely different* from the arc welding process and consequently the *use of the arc has been excluded* throughout the application" (Pltf. Exh. 158, R. 133, 884, 885).

Linde's house patent counsel, speaking to the Patent Office, said: "From a careful comparison it will be evident that the claims in the earlier application are worded quite differently from those here under consideration" (second application, Pltf. Exh. 126, R. 26, 1074, 1092).

In explanation, seemingly to justify so astonishing a departure from the arc phenomenon of the initial application, the patentees, through their new counsel, told the Patent Office—and this is the language the Court of Appeals seized upon (R. 1000) to restore the abandoned and disclaimed arc to the patent:

> "It is difficult, if not impossible, to define an arc precisely, and applicants have contemplated the possibility that a definition may be framed in such terms as to embrace the phenomenon which occurs in their process. There can be no question, however, that there is no such arc involved in their process as occurs in every prior arc process, including that of Robinoff et al." (second application, Pltf. Exh. 126, R. 26, 1074, 1089).

This was not enough. The Patent Office still rejected the claims "as fully anticipated by Robinoff" (Pltf. Exh. 126, R. 26, 1074, 1095). The Patent Office concluded:

> "The invention appears to be in the flux *per se* and not in a new process which is conventional welding in which that flux is used" (second application, R. 1095).

This was on March 23, 1935 (R. 1095).

—Third Application, Arc Denounced.

More than six months later counsel turned up with a fresh application—the third one (Pltf. Exh. 127, R. 26, 1103). This time, on the *third* and successful attempt to get a patent, they unequivocally stated to the Patent Office:

> "the present invention *does* **not** *involve a gas-conducted arc*, **thereby distinguishing radically** from all prior fusion-deposition electric welding processes" (third application, R. 85, Pltf. Exh. 127, R. 26, 1103, 1132).

The Patent Office was told:

"this case presents a basically novel inventive concept * * *.

The basically novel concept is in fusion welding by deposition from an electrode, using an electric current as the source of heat, **without** the use of a gas-conducted arc. Hitherto it has never occurred to anyone that such a thing would be even possible of attainment, as is witnessed by the immense amount of effort put into the development of *arc* welding.

Applicants have found that their concept may be practically attained through the use of a conductive, high-resistance melt of nonmetallic material *which* * * * *supplies the welding heat* * * *"(third application, Pltf. Exh. 127, R. 26, 1103, 1130-1).

At the same time the examiner's reference to the process as an "arc" process, anticipated by Robinoff and others, was challenged. The applicants said:

"It is noted that the Examiner uses the term 'arc welding' in connection with applicants' process. It is pointed out that the present invention does *not* involve a gas-conducted arc, thereby distinguishing radically from all prior fusion-deposition electric welding processes" (third application, Pltf. Exh. 127, R. 26, 1103, 1132).

The claim then was that the process is "entirely different from the arc welding process" (R. 885) in that the current is carried by a "conductive melt," i.e., the "resistive composition" of the second application, which was asserted to be "the principal feature of our process" (see patent, R. 956, col. 2, lines 61-3). "We have discovered," the patent as issued specified:

"a novel process for electric welding wherein the necessary heat is generated by the passage of a heavy electric current * * * *by and through a conductive melt* or welding composition having appropriate electrical resistance properties. *The heat thus generated* melts successive portions of the electrode and the molten material is deposited as weld filler material. The weld

ing composition * * * *provides heating means*" (Pltf. Exh. 124, R. 26, 955, 956, col. 1, lines 20-35).

As the trial court observed (R. 913), "the idea of a radically different scientific principle came not from the inventors, but from plaintiff's patent solicitors."

At the same time the claims to an arc sheathed in flux were cancelled and abandoned (R. 83-5) and the electric arc denounced. It was asserted that:

"The heat for melting the electrode is evidently developed in the conductive melt itself" (see patent, Pltf. Exh. 124, R. 26, 955, 958, col. 1, lines 51-3),

and in one form or another in the first four process claims the process was described as one:

"*without* the formation of any substantial gas-conducted electric arc" (see patent, R. 958, col. 2).

For the arc as the heating instrumentality, there was substituted a pool of "conductive melt," spoken of as a "welding composition having appropriate electrical resistance properties" (patent, R. 956, col. 1, lines 28-30), which is "heated until it *fuses and becomes conductive, forming a subsurface pool*" (R. 957, col. 1, lines 73-5). This was the invention asserted in every one of the 17 process claims[10] (R. 958-60; see appendix, p. 73).

[10] It was put this way in, for example, claim 7 (R. 959):

"The process of electric welding which comprises juxtaposing a metal electrode and a metal member on which metal is to be deposited from said electrode; **filling the gap** between said electrode and said member **with** a finely-divided, unbonded, nonmetallic **material which is fusible at welding temperatures**; heaping an additional amount of said material above said gap so as to submerge said electrode for a substantial distance; **fusing a portion of said material in said gap to render the material electrically conductive**; progressively moving said electrode along said member; passing **through the circuit comprising said electrode, fused material, and work piece** an electric current sufficient to melt successive portions of said electrode and said metal member and **to maintain a pool of said nonmetallic material** in contact with said electrode and adjacent to and covering the molten metal; and simultaneously maintaining **said fused pool**, said end of said electrode, and said molten metal submerged under a quiet layer of said nonmetallic material."

The initial claims to an arc sheathed in flux, having been abandoned and cancelled upon the appearance of Robinoff, the patent issued. The invention so described in the grant would obviously appear to be novel. The difficulty is that there is no such arcless method in actual fact. The trial court held "The evidence is persuasive that *no such basic difference in phenomena is present* in the Jones, et al method" (R. 908); it is an invention "which **does not in point of fact exist**" (R. 915).

Robinoff compared with Jones may be observed on the following page, Robinoff in the upper diagram (Defts. Exh. 108, R. 766, 901), and Jones in the lower (Defts. Exh. 141, R. 719, 906, Defts. Exh. 137, R. 699, 979). While the patent in suit does not carry a diagram, the one used to illustrate Jones is taken from a subsequent patent (Defts. Exh. 137, R. 699, 979) issued to him in which he diagrammatically illustrated the process claimed in the patent in suit.

Where Robinoff shows the arc at the lower tip of the electrode, Jones, in the process claimed but found not to exist, asserts he has his pool of "conductive melt." This, according to his claims, found by the trial court to be without support in the evidence (R. 908), is "a fused non-metallic material which acts as a high-resistance conductor" (patent, R. 958, claim 3), and thus supplies the heat to make the weld.

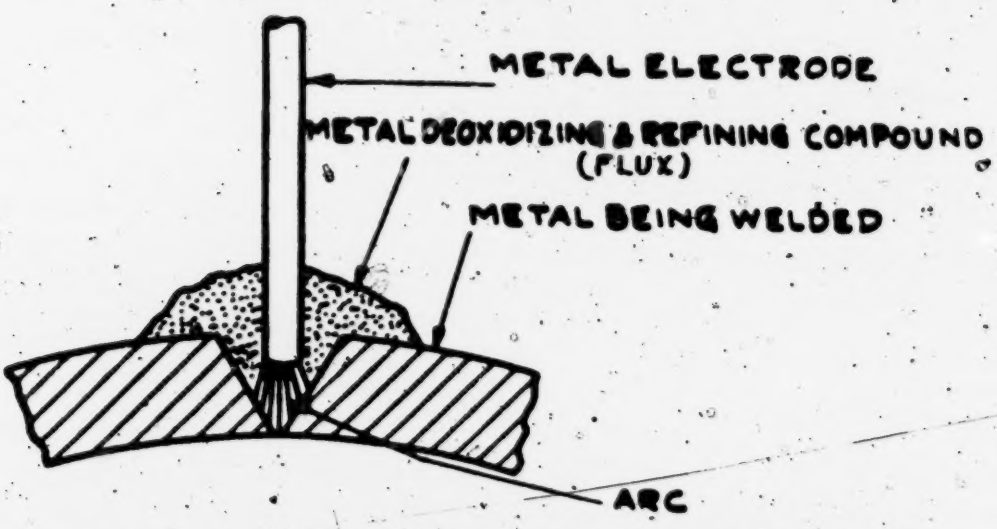
According to Jones, describing, in his later patent, the process of the patent in suit:

> "The flow of current between the electrode and the work heats a region of the welding composition • • • so that it fuses and becomes a high resistance conductive path, and **this region of fused or liquid material supplies heat** to fuse the end of the electrode • • • and the edges of the plates • • •. • • • *the fused material and molten metal occupy the entire space* forming the welding zone" (Defts. Exh. 141, R. 719, 906, Defts. Exh. 137, R. 699, 979; 982, col. 1, lines 14&20).

According to the trial court, this:

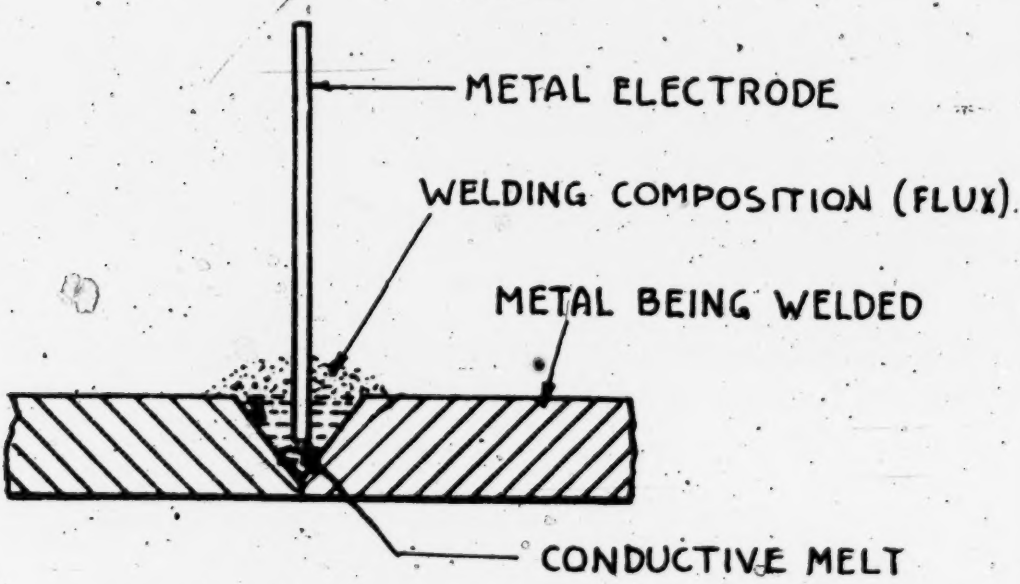
> "is to stake out a process or means of welding which does not in point of fact exist" (R. 915).

ROBINOFF



Note electrode submerged in deep layer of flux in V formed by plates to be welded. The arc, at the tip of the electrode, generates the welding heat (Defts. Exh. 108, R. 766, 991).

JONES



Where Robinoff shows the arc, Jones substitutes the "conductive melt" phenomenon which (R. 914) "came not from the inventors, but from plaintiff's patent solicitors." Said the court (R. 908), "The evidence is persuasive that no such basic difference in phenomena is present in the Jones, et al method." (Defts. Exh. 141, R. 719, 986, Defts. Exh. 137, R. 699, 979).

Result in Courts Below.

The trial court, grouping the process claims in three classes, found them all invalid. The Court of Appeals reversed. It found them all valid. Thus:

1. Process claims 5, 6, and 11 through 17, resting upon the arcless "conductive melt" method, the trial court held invalid because they describe a process existing only in the mind of patent counsel (R. 913). The Court of Appeals reversed. In its view the inventors not only "did not know" whether the sheathed arc, asserted on the first application and cancelled in the later applications, was present or not, but "they carefully avoided any commitment on that subject" (R. 1000). Thus a patent is sustained upon a claim for a method which the inventors have carefully avoided disclosing. The effect is to put into jeopardy anyone practicing submerged arc welding even under a process which indisputably involves the arc phenomenon which now is public property.

2. Certain of the process claims (i.e., claims 1, 3, 4, 7, 8, 9) the trial court found too broad and indefinite to satisfy the statute, 35 U. S. C. 33, because they make no reference to the chemical constituents of the welding composition (R. 915, 925). The Court of Appeals, ignoring the trial court's finding that (R. 915) "the welding composition discovered by the inventors is the heart of the invention," reversed. It said that Finding 7, "that the electric arc present * * * is sheathed by a mantle of molten welding composition," made by the trial court, "correctly described the alleged novel process without in any way referring to any chemical composition" (R. 999). Thus, the sheathed arc, cancelled and abandoned upon the first application, has been written back into the patent grant. The effect is to

withdraw from the public domain the expired Lincoln patent and the expired Robinoff patent on submerged arc welding, and deliver them to respondent Linde. Until the expiration of Robinoff, Linde, as was Lincoln, was licensed under Robinoff (R. 418, 426, 402, 412, Defts. Exhs. 97, 97A, 97B, 97C; R. 425). That patent, under which Linde once paid royalties (R. 419), now having expired, is by force of the decision below regranted to Linde.

3. Process claim 2 the trial court held invalid as claiming compounds found inoperative (R. 925). The Court of Appeals reversed. It narrowed the word "silicate" as used in the claim to mean metallic silicates and then narrowed the metallic silicates to nine, which it erroneously assumed had been found operative (R. 1001).

—Flux Claims of Patent.

The discovery of the patentees lies in a specific composition or flux, defined in claims not designated as infringed.

—Nature of Discovery.

What the patentees found was a new flux for use in the conventional process (R. 912, 927, Finding 27). This is plain from the assertions of the patentees, the initial conclusion of the Patent Office, the fact finding of the trial judge. Thus, the:

Patentees, in the initial application—before it was "revised" by Linde's house counsel—asserted the discovery lay in "a fluxing material for electric arc welding" and a method "which consists in substantially enclosing the arc in a flux" (first application, Pltf. Exh. 125, R. 26, 1043, 1054).

Patent Office, when the second application was before it, in response to the concession that the patentees

had "contemplated the possibility" that an arc might be present in their process (second application, Pltf. Exh. 126, R. 26, 1074, 1089)—and before being advised in the course of the prosecution of the third application that the "conductive, high-resistance melt • • • supplies the welding heat," thereby "distinguishing radically" from all prior welding processes (third application, Pltf. Exh. 127, R. 26, 1103, 1131-2)—ruled:

> "The invention appears to be in the flux *per se* and not in a new process which is conventional welding in which that flux is used" (second application, R. 1095).

Trial court found "the welding composition discovered by the inventors is the heart of the invention" (R. 915, 925, Finding 15); "the only novelty presented • • • resides in the use [in the Robinoff process] of a different welding composition" (R. 927, Finding 27).

Respondent Linde, prior to the "revisions" of its house counsel, was of the same view. Negotiating for the purchase of the application from the inventors, and undertaking to interest his employer in the patent, R. E. Cornwell, the Linde executive in principal charge of the patent from the start, wrote to his superior:

> "It is quite evident that the composition of the flux is the controlling factor • • •.
>
> Mr. Kennedy [one of the patentees] pointed out that their patent covered the chemical composition of the flux, and owing to the nature of such a patent it was difficult to set forth the actual composition of the flux without giving too much information to the general public" (Defts. Exh. 93, R. 425).

Cornwell similarly reported to F. S. Warzeski, another of his superiors, that after study of "materials used for fluxes" the inventors:

"finally obtained a flux that was entirely satisfactory and gave them the desired properties for a satisfactory weld" (Defts. Exh. 94, R. 425, 417).

The flux the patentees discovered, which gave them this "satisfactory weld," consisted, not of the *manganese* silicate Lincoln used, but of calcium and *magnesium* silicates in specified proportions, to which was added a small amount of calcium fluoride which "is a very useful material to liquefy slags" (R. 39). With this flux they produced improved results in the use of the old Robinoff process (R. 908, 912). This is the flux respondent demonstrated to the trial court (Pltf. Exhs. 133A-B, R. 230, 107, 883). It is the flux respondent used in attaining its "extensive commercial success" (R. 925, Finding 9). It is covered by claims 10, 28, 29 which call for calcium and magnesium silicates in specified proportions, and claims 19, 21, 25 which call for a flux "containing a major proportion of calcium silicate" (patent, R. 960). Admittedly these claims are not infringed (R. 17).

This modest discovery—and whether even that is patentable in the light of the prior art, or, if patentable, has been adequately disclosed and claimed—is not here in question. Those claims (i.e., claims 10, 28, 29 and 19, 21, 25) are not charged as infringed.

What has happened, as will be seen, is that the discovery—limited to a specific calcium and magnesium silicate flux—has been expanded to embrace not only the new but to swallow up the old as well.

—Enlarged to Embrace Prior Art.

The patentees, instead of confining their claims to their discovery (i.e., claims 10, 28, 29 and 19, 21, 25, which are not in issue), laid claim also to:

Any "material" which would provide a conductive melt (patent, R. 958, claims 1, 3, 4, 7, 8, 9);

All "silicates" (claims 2, 5, 12, 16, 26);

All "metallic silicates" (claim 24);

All "alkaline earth metal silicates" (claims 6, 11, 13, 14, 15, 17, 18, 20, 22, 23, 27), namely all silicates of calcium, magnesium, strontium, and barium (R. 925, Finding 11). Even this is broader than their discovery. As their notes show (Defts. Exh. 88, R. 425, 1153) the only alkaline earth metal silicates they tried were calcium and magnesium silicates.

All these broad categories of claims have been held valid by the Court of Appeals; four of the claims have been held infringed.

The four claims held infringed, claims 18, 20, 22, 23, (R. 960), call for a composition:

"containing a major proportion of alkaline earth metal silicate * * *."

The Lincoln flux is "composed principally of *manganese* silicate". (R. 919-20). This is *not* an alkaline earth metal silicate, and the trial court so found (R. 925, Finding 12). Therefore, as the trial court held:

"it does not literally infringe" (R. 920).

The Court of Appeals did not find to the contrary.

However, the trial court condemned it as an equivalent "in welding operation" (R. 916, 919-20)—and the Court of Appeals agreed (R. 1003)—because, although not mentioned in the claims, the inventors in the specification of the patent summarized their record of experiments, saying:

> "We have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel and aluminum both in binary and ternary combinations, in various proportions [that is, they have used calcium silicate combined with one or two of the other silicates mentioned]. * * * While a number of these * * * are more or less efficacious * * * we prefer to use silicates of the alkaline earth metals, such as calcium silicate * * *" (patent, R. 956, col. 1, lines 62-72).

Note that what they said was "We have used calcium silicate *and*" the other eight named silicates "in binary and ternary combinations" (R. 648-9). This accords with their experimental notes (Defts. Exh. 88, R. 425, 1153). The notes show that what they used was calcium silicate either alone or in combination with one or two of the others.[1] So read, the specification is a faithful summary of their experiments.

The trial court, however, read this specification, and the reviewing court agreed, to mean the inventors had used, not calcium silicate in combination with one or two of the others, but had used *each* of the nine in predominant proportion, with the others.

Thus, because the inventors in the summary of their experiments, so interpreted, said they had used and found "more or less efficacious" nine specified silicates—of which the manganese silicate Lincoln used is one—the trial court, as did the Court of Appeals, read each of the nine, including the manganese silicate of Lincoln, into the claims of the patent.

By this process of expanding *claims* confined to alkaline earth metal silicates—by incorporating therein the reportorial comments of the inventors concerning other elements found "more or less efficacious"—the court has enlarged the patent to embrace prior art. The patent has been rewritten. The result is that the court has regranted to respondent Linde the now expired Miller patent, No. 1,754,566, which covers the manganese silicate flux made by Lincoln, and has expanded the grant to cover also the prior long-used unpatented Robinoff aluminum silicate flux. Robinoff did not seek a patent on his aluminum silicate flux because he was:

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[1] They experimented with 69 different fluxes of which 63 consisted chiefly of silicates. Of these, 52 contained calcium silicate, either alone or in predominant proportion, and except for certain specific combinations of calcium and magnesium silicates, all of these were found to be unsatisfactory (Defts. Exh. 88, R. 425, 1153).

"aware of the fact that the ingredients of protective coating were broadly covered by other patentees" (Pltf. Exh. 227, R. 543, 897).

Thus the flux Robinoff could not patent is now made the monopoly of Linde.

So far as concerns the manganese silicate used by Lincoln, all that the patent teaches is that this "may be added in moderate amounts" (R. 956, col. 2, line 33). It clearly is not to be used in the "major proportion" now authorized by the court's revision of the patent grant. Similarly, while the patent limits the amount of aluminum silicate to a *minor* proportion (see patent, R. 956, col. 1, lines 73-4, and claims 26 through 29, R. 960), the court has rewritten it to call for "a *major* proportion," which is what Robinoff used (R. 507, 310).

Moreover, some of the nine silicates mentioned in the specification, which now are to be read into the patent grant as equivalents, are inoperable. They are "more or less efficacious," the inventors said. They advised the Patent Office that at least one, iron silicate, is "not • • • satisfactory" (second application, Pltf. Exh. 126, R. 26, 1074, 1078). Their experiments demonstrated that others likewise are unsatisfactory (Defts. Exh. 88, R. 425, 1153). They are the compounds found "less efficacious."

All these are swept into the enlarged Jones, even though they admittedly are not the alkaline earth metal silicates on which the patent issued.

Two other claims, 24 and 26, the trial court held invalid (R. 925). They claim a monopoly for flux purposes (in claim 26, R. 960) of silicates generally and (in claim 24, R. 960) of all metallic silicates. They are invalid because they are too broad; they embrace compounds which are inoperable. Said the trial court, "The evidence is clear and convincing that many silicates, even many metallic silicates are inoperative" (R. 918, 925-6, Finding 17). The Court of Appeals reversed. The reviewing court did not challenge the trial court's fact finding. Instead, having, for

other purposes turned to the inventors' repictorial notes in the specification to expand the patent grant, the Court of Appeals, for the purpose of upholding these claims, narrowed them (R. 1001-2) to the "nine metallic silicates" mentioned in the specification and then compounded its error by erroneously adding—"which had been proved operative" (R. 1001). They had not (Defts. Exh. 88, R. 425, 1153). As has been pointed out, they confessedly were only "more or less efficacious" and some were wholly unsatisfactory (second application, Pltf. Exh. 126, R. 26, 1074, 1078).

Composition claim 27, for a flux "conductive when molten," the trial court held invalid as depending upon the nonexistent conductive melt method (R. 925). The Court of Appeals reversed (R. 1001).

Misuse of Patent.

Respondent has exploited the patent in suit by means of an elaborate system of licenses covering the patented process (Pltf. Exhs. 215, 216A to S, R. 400, 401, 1137), and contracts for the purchase of the licensee's "entire requirements" of unpatented welding electrodes (Pltf. Exhs. 218, 218A to G, R. 404, 1145).

The exploitation has been extensive. From its licensees, up to the time the record closed, Linde had collected more than $6,000,000 in royalties (R. 395). Part of this was, until the Robinoff submerged arc patent expired, paid to the owners of Robinoff (R. 419) under which both Linde and Lincoln were licensees (R. 402, 412).

The exploitation commenced immediately upon the issuance of the patent. Having established color of validity for the patent by the device of a consent decree (Pltf. Exh. 212, R. 393-4, 413), entered in an action brought against a user ten days after the issuance of the patent, respondent Linde has entered into license agreements running to 750 users (R. 395). The licenses grant rights under the patent

in suit and others.[12] Coupled with such licenses, Linde regularly entered into contracts covering the licensee's entire requirements for unpatented metal electrodes used in the patented process[13] (R. 400-7, 412, 420-1). The electrode contracts were written for the term of one year but were automatically renewable from year to year, without further action of the parties, unless cancelled by written notice given 60 days before the end of the contract year (Pltf. Exh. 218G, R. 404, 1145).

A studied effort was made to have these two instruments bear different dates.[14] Despite this many such agreements were concurrently executed. Admittedly, as the trial court found, "ten percent of the existing license

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[12] Linde's standard form of license in use at the time this action was brought grants (Pltf. Exh. 216-S, R. 400, 1137):

"a non-exclusive, non-assignable license under all welding process claims contained in the Unionmelt Patent Rights to use the Unionmelt welding process in all plants in the United States operated by the Licensee and also a concurrent non-exclusive, non-assignable license under all welding composition claims contained in the Unionmelt Patent Rights, to use in such plants, but not to make, Unionmelt covered by such composition claims."

[13] The original electrode contract form used by Linde specified (Pltf. Exh. 218A, R. 404):

"Buyer agrees to purchase * * * Buyer's entire requirements of bare rod electrodes for use in and only in a [i.e., Linde's] process of electric welding * * *".

The form used by Linde at the time this action was brought, specified (Pltf. Exh. 218G, R. 404, 1145):

"Buyer agrees to purchase * * * Buyer's entire requirements of bare rod electrodes for use in a [i.e., Linde's] process of electric welding * * *"

[14] Linde's instructions to salesmen were "to avoid having the contract and the license executed the same day" (R. 421). Sales offices were cautioned (Defts. Exh. 98C, R. 425, 1268, 1271):

"the date in paragraph numbered 1 of the rod contract should preferably be later than the beginning date of the license period, and could most reasonably be approximately the date of the first rod shipment."

The reason was "so that no one could gain an inference that there was any connection between the two" (R. 421).

agreements and the rod purchase contracts were executed on the same day" (R. 921, 20).

The result is that once the customer has accepted the license and signed the electrode purchase contract, there is established—because he must buy his "entire requirements"—an agreement that he will not thereafter use the commodities of a competitor.

The trial court held this was not unlawful (R. 922). The Court of Appeals affirmed (R. 1003).

The question is, whether, by the device of causing such contracts to be separately executed, the transaction may be deemed free of the vice of unlawful extension of the patent monopoly.

SPECIFICATION OF ERRORS.

The Court of Appeals erred:

1. In holding valid process claims 1 through 9 and 11 through 17 of Jones patent No. 2,043,960 and in reversing the judgment of the District Court with respect thereto.
2. In holding valid composition claims 24, 26 and 27 of said patent and in reversing the judgment of the District Court with respect thereto.
3. In holding valid and infringed composition claims 18, 20, 22 and 23 of said patent and in affirming the judgment of the District Court with respect thereto.
4. In holding valid claims to a process found not to exist in fact.
5. In refusing to hold the claims of said patent invalid under 35 U. S. C. 33 for failure to "particularly point out and distinctly claim" the invention.
6. In reading into the claims of said patent sheathed are claims cancelled and abandoned by the patentees in Patent Office proceedings.

7. In holding valid, claims to a process, the sole novelty of which is found to reside in the composition used therewith, which do not describe the constituents of the composition.

8. In expanding the claims of said patent to embrace the specifications.

9. In interpreting said patent to hold manganese silicate an equivalent of alkaline earth metal silicates claimed in said patent.

10. In holding valid, claims of said patent interpreted to embrace inoperable compounds.

11. In refusing to hold the claims of said patent anticipated.

12. In treating findings of fact as conclusions of law and treating conclusions of law as findings of fact.

13. In refusing to hold said patent has been made misused in violation of section 3 of the Clayton Act, 15 U. S. C. 14.

SUMMARY OF ARGUMENT.

I. **The process claims** of the patent are invalid because:

1. The arc, as the heating instrumentality, having been written out of the patent in order to distinguish from prior art, cannot now be restored. To restore it is to recall from the public domain that which is public property (see pp. 33 to 44).

2. Even if the arc were restored the patent still would fail because it makes no disclosure of any means or mode of operation, whether new or not, to effect the sheathing of the arc which it now is said constitutes the novel feature of the invention (see pp. 44 to 46).

3. Since the novelty of the process, if any, resides in the composition, the process claims are in any event invalid for failure to make any disclosure concerning the constituents of that composition (see pp. 46 to 50).

II. **The flux claims** of the patent are neither valid nor infringed:

1. The claims are invalid because they are broader than the invention and reclaim prior art. They therefore fail to satisfy the statute (see pp. 51 to 57).

2. The claims cannot be read as infringed. To do so would be to subject to the monopoly of the patent much that is old in the art (see pp. 57 to 67).

III. **Unlawful tying agreements** bar enforcement of the patent. By the device of executing along with the license agreement, in a substantial number of cases, contracts for the licensee's "entire requirements" of unpatented welding electrodes, the monopoly of the patent has been unlawfully extended to unpatented articles (see pp. 67 to 68).

IV. **Miscarriage in review** procedure has occurred by treating findings of fact as conclusions of law, and conclusions of law as findings of fact (see pp. 68 to 70).

ARGUMENT

I. PROCESS CLAIMS INVALID—AS WRITTEN THEY COVER NONEXISTENT PROCESS—AS INTERPRETED THEY RE-CLAIM PRIOR ART.

The process claims of the patent are invalid. As written they cover a nonexistent process; as interpreted they re-claim prior art.

This strange result has come about because the Court of Appeals, reversing the trial court, has applied principles of law in conflict with this Court's cases and in defiance of the statute, 35 U. S. C. 33, which requires the inventor to "particularly point out and distinctly claim" the invention.

1. Court Has Restored to Patent Abandoned Sheathed-Arc Claim.

As will be recalled, in order to obtain the patent, claims to "electric *arc*" welding were cancelled and abandoned.

Initially the inventors laid claim to a process of "electric arc welding under deep flux" (R. 71-2, 75, 81-2, 90, 417, 802, 909, Pltf. Exh. 125, R. 26, 1043, 1045, 1046, 1052-4, first application). The application was "replete with references to the presence and use of an electric arc" (R. 909). The use of the electric arc as the heating medium, however, was old in the art (R. 440). Robinoff, for example, had claimed it and already had a patent on welding with the use of the arc under deep flux (R. 975) which, along with others, was cited by the Patent Office (R. 75, 81).

It became necessary, therefore, if a process patent were to issue, to distinguish from the prior art and to establish as the heating medium a phenomenon other than the arc. In place of the arc phenomenon, where the current jumps the gap through an ionized gaseous or vaporous medium—the application in the meantime having been sold to respondent's parent corporation—the new patent solicitors sub-

stituted a molten welding composition, or "conductive melt," acting as a resistor to generate the heat.

At the same time, to meet the patent examiner's references to the prior art, original claim 16 (Pltf. Exh. 125, R. 26, 1043, 1054, first application), for:

> "A method of electric arc welding in the presence of a flux which consists in substantially *enclosing the arc in a flux* which has been rendered chemically inactive"

and all claims to "submerged arc" and "enclosed arc" welding were cancelled and abandoned. In lieu thereof the invention described, and ultimately allowed in the patent which issued upon the third application, was for a welding process which disclaimed "the formation of any substantial gas-conducted electric arc" (see patent, R. 958, claims 1 through 4) and in which the heat was (patent, R. 958, col. 1, lines 52-3):

"developed in the conductive melt itself." [15]

The patent as issued was thus distinguishable from the arc process. The gap between the end of the electrode and the work piece, bridged in the conventional process by the arc conducted by an ionized gaseous or vaporous me-

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[15] This, in one form or another, was asserted in all of the 17 process claims of the patent as it issued (R. 958-60; see also Appendix, p. 73). Thus, in claim 1 of the issued patent the patentees laid claim to (R. 958):

> "The process of electric welding which comprises the steps of juxtaposing an electrode and a conductive member on which metal is to be deposited; *establishing* between said member and said electrode **a conductive path of a high-resistance melt** of chemically stable fusible material having at welding temperatures substantially the fluidity and electrical conductivity of a fusible silicate, and substantially free from substances capable of evolving large amounts of gases during welding; *passing through said melt an electric current of sufficient strength to maintain its conductivity*, progressively melt the required amount of metal, and cause the resulting molten metal to coalesce with said member; *and maintaining said melt in contact with said electrode throughout the welding operation to avoid the formation of a substantial air-conducted electric arc* between the electrode and the said conductive member."

dium, became instead "a conductive path of a high-resistance melt" with the heat "developed in the conductive melt itself" (R. 958).

The trial court, however, found that the process so described and claimed "*does* **not** *in point of fact exist*" (R. 915). In the invention as practiced, as distinguished from the process described and claimed in the patent, the arc is the heating instrumentality (R. 908-12). "It is still an arc" (R. 910) as the trial court found, but encased "in a different medium" (R. 912) in that "the vaporized area of ionization constituting the arc zone is entirely blanketed and shielded by a mantle of fused welding composition" (R. 911). Accordingly, having examined the commercial practice of the claimed invention, the trial court found (R. 924, Finding 7):

> "*the electric arc present* between the electrode and base metal *is sheathed by a mantle of molten welding composition* and * * * the conductive arc area is composed predominantly of vaporous welding composition."

Upon this the Court of Appeals seized (R. 998) to sustain the patent. The trouble is this is the very claim which the patentees abandoned and cancelled. It is original claim 16, above quoted. When the applicants wrote out of the patent that claim, and all claims to submerged-arc and sheathed-arc welding, they put forever outside the scope of this patent the claim to a sheathed arc which now has been read back into the patent.

—(a) Claim Once Abandoned Cannot So Be Restored to Patent Grant.

A claim, once abandoned, cannot so be revived. So this Court's cases hold. The claim having been abandoned in order to obtain the patent, *Sutter v. Robinson* (1886), 119 U. S. 530, the patentee (p. 541):

> "is not at liberty now to insist upon a construction of his patent *which will include what he was expressly required to abandon* and disavow as a condition of the grant."

The Court applied the same rule in *Schriber-Schroth Co. v. Cleveland Trust Co.* (1940), 311 U. S. 211. The Court said (p. 218):

"Where the patentee in the course of his application in the patent office has, by amendment, cancelled or surrendered claims, those which are allowed are to be read in the light of those abandoned and an abandoned claim *cannot* be revived and restored to the patent by reading it by construction into the claims which are allowed." [16]

Nor is it material whether the examiner was right or wrong. As the Court observed in *Exhibit Supply Co. v. Ace Patents Corporation* (1942), 315 U. S. 126, 136:

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[16] The Court, for the protection of the public and the patent system, has rigorously applied this rule. See, for example:

Weber Electric Company v. E. H. Freeman Electric Company (1921), 256 U. S. 668, where, it appearing that (p. 676) "the chief concern of the applicant thereafter [after the citation of prior patents by the Patent Office] was to distinguish his construction from that of Kenney," the Court held (p. 677) "Having thus narrowed his claim * * * the patentee may not by construction * * * give to the claim the larger scope which it might have had without the amendments * * *."

Shepard v. Carrigan (1886), 116 U. S. 593, where the Court held (p. 598) "If an applicant, in order to get his patent, accepts one with a narrower claim than that contained in his original application he is bound by it. If dissatisfied with the decision rejecting his application, he should pursue his remedy by appeal."

Roemer v. Peddie (1889), 132 U. S. 313, where the Court held (p. 317) "when a patentee, on the rejection of his application, inserts * * * restrictions for the purpose of obtaining his patent, he cannot, after he has obtained it, claim that it should be construed as it would have been construed if such limitations and restrictions were not contained in it."

Altoona Publix Theatres, Inc. v. American Tri-Ergon Corp. (1935), 294 U. S. 477, where the Court observed (p. 492) "Nor can an interpretation be given the allowed claims which would revive the claims which were abandoned in order to obtain the patent."

(Continued on following page)

"By the amendment, he, [the patentee] recognized and emphasized the difference between the two phrases and proclaimed his abandonment of all that is embraced in that difference. * * * As the question is one of construction of the claim, it is immaterial whether the examiner was right or wrong in rejecting the claim as filed. * * * It follows that what the patentee * * * has disclaimed * * * *cannot* now be regained * * *."

What this Court says may not be done, the Court of Appeals has done. It has revived and restored to the patent the very claims which were cancelled and abandoned in order to distinguish from the prior art. The result is that the prior and expired Robinoff patent (and the expired Lincoln as well) is written back into this patent, thus reissued to respondent Linde. Linde, instead of paying royalty on Robinoff's submerged arc process, as it did for years, in licensing the patent in suit (R. 419, 426) becomes the collector of royalties under that expired patent now written into its own.

Thus, that which was public property becomes that of respondent Linde.

—(b) Device Chosen to Restore Arc Distorts Clear Language Used in Patent Claims.

Having disclaimed the arc as the heating medium to get the patent, Linde now, for the purposes of this suit, must read it back into the patent.

(Continued from preceding page)

Royer v. Coupe (1892), 146 U. S. 524, where the Court held (p. 532) "a patentee cannot successfully contend that his patent shall be construed as if it still contained the claims which were so rejected and withdrawn."

To the same effect are: *Smith v. Magic City Kennel Club, Incorporated* (1931), 282 U. S. 784, 790; *Knapp v. Morss* (1893), 150 U. S. 221, 224; *Corbin Cabinet Lock Company v. Eagle Lock Company* (1893), 150 U. S. 38, 40; *Morgan Envelope Company v. Albany Perforated Wrapping Paper Company* (1894), 152 U. S. 425, 429; *I. T. S. Rubber Company v. Essex Rubber Company* (1926), 272 U. S. 429, 443-4; *Phoenix Caster Company v. Spiegel* (1930), 133 U. S. 360, 368; *Hubbell v. United States* (1905), 179 U. S. 77, 80.

This, as reflection will make clear, is a labor of necessity for respondent. In order to get the patent, the arc, as the heating instrumentality, was denounced and abandoned. It was by substituting for the arc as the heating medium the molten pool of flux, "thereby distinguishing radically from all prior fusion-deposition electric welding processes" as the Patent Office was told (third application, R. 85, 864, Pltf. Exh. 127, R. 26, 1103, 1132) that the patentees obtained the patent.

However, to establish infringement by the Lincolnweld process, which follows the old and expired Robinoff process —"which undoubtedly involves an electric arc phenomenon" as the trial court found (R. 908, see also photograph facing page 10)—it is necessary for respondent somehow to restore to the patent, as the heating instrumentality, the once-abandoned arc. Otherwise the patent cannot be read to cover an arc process.

Linde's problem thus is to rewrite the patent, which, as the trial court found, describes a phenomenon (R. 915):

"which does not in point of fact exist"

and of which the Court of Appeals, referring particularly to process claims 5, 6, and 11 through 17, said (R. 1000):

> "None of these nine claims refer in any manner to the presence or absence of an arc, either directly or by reasonable inference"

so as to reconcile it with the process as practiced which does embrace the arc phenomenon as the heating instrumentality, as the trial court found[17] (R. 908, 910, 911, 915, 924, Finding 7). The fundamental difficulty is that re-

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[17] The trial court's finding (R. 927, Finding 27) that, except for the flux, there is no difference between Robinoff and Jones as practiced, is confirmed by the pocketbook test. Until the expiration of Robinoff, Linde paid part of the royalties collected by it from the Jones process to the owners of Robinoff (R. 419). Robinoff headed the list of patent rights Linde purported to grant by its license (R. 402).

spondent has patented one process—a process existing only in the mind of patent counsel (R. 914, 915)—*and it practices another*. To prevail it must somehow keep one foot in the patent, the other in the arc, and maintain a neat balance the while lest it fall between the two.

What respondent argues for, this Court's cases condemn. Note, for example:

Altoona Publix Theatres, Inc. v. American Tri-Ergon Corp. (1935), 294 U. S. 477, where the patent, found valid by the court below, was struck down because (p. 487) "The patent thus upheld is one which was neither claimed nor granted."

DeForest Radio Co. v. General Electric Co. (1931), 283 U. S. 664, where, in response to the patentee's resort, as here, to (p. 683) "statements in the specifications" to support his claim that "essentially different principles control," the Court replied (p. 683) "if Langmuir's invention is so to be defined, it is *not* the invention claimed by the patent."

Here the device chosen to read the abandoned arc back into the patent, is to read the word "fluid" in the specification (patent, R. 958, col. 1, line 30) to mean not only "liquid" but also "gaseous" or "vaporous."

The argument is that when the patent asserts that the necessary heat is generated, not by an arc, but by passing an electric current "by and through a conductive melt or welding composition having appropriate electrical resistance properties" (R. 956, col. 1, lines 27-30) and that the heat for melting the electrode and plates is "developed in the conductive melt itself" (R. 958, col. 1, lines 52-3), the term "conductive melt" means:

"such welding composition in its vaporous state."

The pertinent question is, Why does not the patent so state?

Respondent's ingenious argument to recover the arc, it will be observed, requires that the flux or "conductive melt" be converted in part into a "gas" or "vapor." That done, Linde then will have a patent on a "conductive melt" which has a hole or core in it in which can be inserted the arc Linde now must have. Thus, the abandoned sheathed arc will have been restored to the patent. Against this kind of reckless reading of a patent, this Court warned in *White v. Dunbar* (1886), 119 U. S. 47, when it said (p. 51):

> "Some persons seem to suppose that a claim in a patent is like a nose of wax which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from, what its words express."

The difficulty with respondent's argument is that, except for the word "fluid"—of which more will be said later—there is nothing in the patent upon which to mount such a claim. Even assuming that the word "fluid," as used in the specification, is, as the Court of Appeals thought (R. 1000), susceptible of the meaning "vaporous" or "gaseous," surely a patentee "cannot claim the benefit of an element of his invention thus vaguely and indefinitely hinted at." *Western Electric Manufacturing Company v. Ansonia Brass & Copper Company* (1885), 114 U. S. 447, 452. The patent must be "clear-cut," as the Court had occasion to observe in *United Carbon Co. v. Binney & Smith Co.* (1942), 317 U. S. 228, 236, "to enable courts to determine whether novelty and invention are genuine," and, *General Electric Co. v. Wabash Appliance Corp.* (1938), 304 U. S. 364, 369, *Brooks v. Fiske* (1853), 15 How. (56 U. S.) 212, 214, "so that the public may know what they are prohibited from doing during the existence of the monopoly, and what they are to have at the end of the term, as a consideration for the grant."

The trial court, be it noted, was unable to find in the word "fluid" the strange meaning now attributed to it.

The Court of Appeals, however, seized upon it and on that ground reversed the trial court. The Court of Appeals said (R. 1000):

"It is clear that in this respect the court should adopt the same interpretation of the term 'conductive melt' which the applicants reasonably expected it to have when they coined it.[18] It is clear to us from its context in the patent, and the circumstances of its origin clearly indicate that the applicants intended the phrase to mean, when heated to welding temperatures, in either liquid or vaporous state.

This construction is quite consistent with the views expressed by experts of both plaintiff and defendants;[19] with the Welding Handbook[20] of The American

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[18] The applicants did not coin the term "conductive melt." It was coined for them by Union Carbide's house patent counsel. The circumstances of its origin are set forth in a letter from R. E. Cornwell, respondent's vice president, forwarding the second application for signature by the patentees (Pltf. Exh. 158, R. 133, 884). The letter says (R. 884):

"There was some question regarding the term that should be used to cover the material called a 'flux' in the previous application. Kennedy [one of the patentees] suggested that it be called a '*fused electrolyte*' but this did not meet with the approval of Mr. Becket. We considered the possibilities of calling it a '*conductive slag*' or '*fused resistor*,' but it seemed advisable to call it a '*conductive melt*' • • •."

The letter further says (R. 885):

"You will note that the welding process has been defined as a process entirely different from the arc welding process and consequently the use of the *arc has been excluded* throughout the application."

[19] The reference is to the testimony of Lucien Yeomans, who, speaking of the expired J. C. Lincoln patent, which dealt with the introduction of an inert gas through a hollow electrode to blanket the molten weld metal, said (R. 755):

"Q. • • • that is not a liquid; that is a gas, that you are speaking of?

A. That is a gas.

Q. I suppose you might call it a fluid?

A. Technically, it is a fluid."

(*Continued on following page*)

> Welding Society, and with Webster's New International Dictionary since 1936, which defines 'fluid' to mean 'liquid or gaseous.' The specification expressly states, 'that the relatively high current densities which are preferably used superheat the *molten metal and welding composition, making them highly fluid.*' ''

Thus, the sole basis for the interpretation put upon the patent by the Court of Appeals is the meaning to be attributed to the word "fluid" as used in the specification. But the quotation from the specification relied upon *is incomplete.* Read in context, what the specification says is:

> "The relatively high current densities which are preferably used superheat the molten metal and welding composition, making them highly fluid. [This is where the Court of Appeals stopped. Had it read further, it would have seen that the next sentence says:] The **liquid currents set up in this highly fluid mass** effectively mix the metal and welding composition, thereby cleansing or washing impurities out of the metal, and then completely separate the metal as it is deposited" (R. 958, col. 1, lines 27-34).

Manifestly, the term "fluid" is used in the patent as a synonym for "liquid." It is not used to mean "gaseous" or "vaporous." This is apparent from the second sentence of the specification above quoted.

Not only is the meaning sought to be attributed to the word "fluid" inconsistent with the record, with the

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While technically "fluid" may mean "gaseous," this, as Yeomans further pointed out (R. 762), "is not practical shop language at all. 'Fluid' to a shopman, always means liquid. It does not mean air, gas, or anything of that kind."

[20] The Welding Handbook, on which the Court of Appeals relied, in an article published by Linde upon "Submerged Melt Welding," says (Pltf. Exh. 163, R. 356, pp. 2-3):

> "The granulated material is the basic feature of this method of welding * * *. The material is a nonconductor of electricity when cold but in the **molten state** it becomes a highly resistant conductive medium."

representations made to the Patent Office to get the patent, with the express language of the patent itself,[21] and with the fact finding of the trial court, but in Jones's subsequently issued patent No. 2,152,194 (Defts. Exh. 137; R. 699, 979) it was unequivocally asserted (R. 982, col. 1, lines 10-20) that in the patent here in suit:

> "The flow of current between the electrode and the work heats a region of the welding composition • • • so that it fuses and becomes a high resistance conductive path, and **this region of fused or liquid material** supplies heat to fuse the end of the electrode • • • and the edges of the plates • • •. The • • • *fused material and molten metal* **occupy the entire space** forming the welding zone."[22]

Since the "fused material and molten metal occupy the entire space" there can be no gap, or hole, into which

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[21] The patent describes "conductive melt," said to be "the principal feature of our process" (R. 956, col. 2, lines 62-3), which Linde now would turn into "vapor" or "gas," as a "welding composition having appropriate **electrical resistance properties**" (R. 956, col. 1, lines 28-30) which is "heated **until it fuses and becomes conductive, forming a subsurface pool**" (R. 957, col. 1, lines 73-5), and thus "provides heating means" (R. 956, col. 1, line 35; R. 958, col. 1, lines 51-3). Not only is a "gaseous" or "vaporous" are not suggested, but it is said, as for example in claim 2, that the current is passed "substantially wholly **through a pool** of silicate fused in situ, *without* the formation of any substantial gas-conducted electric arc" (R. 958). The current is sent, not through an arc, but, as claim 4 has it, "through a **pool** of non-metallic material fused in situ" (R. 958) or, as claim 7 puts it, through a circuit "comprising said electrode, **fused material**, and work piece • • • to maintain a **pool** of said nonmetallic material" (R. 959). Similarly, claim 8 calls for "a localized *subsurface pool*" (R. 959), claim 9 speaks of "maintaining said *fused* pool" (R. 959), and claims 26, 27, 28 and 29 refer to the composition, not as conductive when "gaseous" or "vaporous," but as "**conductive when molten**" (R. 960).

[22] Elsewhere in the patent it is similarly emphasized that (R. 983, col. 2, lines 26-8) "the molten welding composition and fused or molten metal occupy the *entire* space of the welding zone" and that (R. 983, col. 2, lines 45-8) "The result • • • is *entirely different* from • • • electric arc welding."

to slip the arc. There is no room for gas or vapor; therefore there can be no arc.

It is idle, therefore, to assert that the patent issued upon an arc process operating in "gaseous" or "vaporous" conductive melt, especially when all that can be pointed to is the word "fluid" in an isolated sentence torn from context. To write this strange meaning into the patent would be to give to "the inventor the means of practising upon the credulity or fears of other persons, by pretending that his invention was different from its ostensible objects." *Brooks v. Fiske* (1853), 15 How. (56 U. S.) 212, 215; *Carlton v. Bokee* (1873), 17 Wall. (84 U. S.) 463, 471-2.

The judgment of the Court of Appeals thus rests on plain mistake of law, based upon an erroneous reading of the patent grant. The result is to rewrite and issue to Linde a basic patent upon an entire industry swallowing up all that was old at least as far back as Robinoff.

If this may be done then the patentees have discovered a way to talk to the Patent Office from one side of the mouth and to the public from the other—to the public's cost, up to the time the record closed, of $6,000,000, with millions more to come during the life of the patent.

2. If Arc Restored Patent Still Invalid; It Makes No Disclosure of Sheathing.

If, however, the sheathed arc be restored, the process claims of the patent stand no better. They patent only a result and are, therefore, invalid. 35 U. S. C. 33.

The reason is that the claims, so redrawn, make no disclosure of any means or mode of operation, whether new or not, to effect the sheathing of the arc. So drawn, the claims are to anything which sheathes or encases the arc, and by whatever means. This will not satisfy the statute:

Permutit Co. v. Graver Corporation (1934), 284 U. S. 52, 60;

Holland Furniture Company v. Perkins Glue Company (1928), 277 U. S. 245, 256-8;
General Electric Co. v. Wabash Appliance Corp. (1938), 304 U. S. 364, 368, 371, 374;
Halliburton Oil Well Cementing Co. v. Walker (1946), 329 U. S. 1, 9-10, 12;
Sewall v. Jones (1875), 91 U. S. 171, 185, 186.

In the *Sewall* case, 91 U. S. 171, for example, the Court held invalid a patent for preserving Indian corn, the asserted novelty of which lay in so cutting the kernel from the cob as to leave a part of the hull on the cob, thus breaking open the kernels and liberating the juices. But there, as here, the difficulty was that the patent made no such disclosure. Said the Court (p. 185) "There is no such language in the patent," adding (p. 186):

> "the patentee does not even recommend that the kernels shall be cut off in such manner that a large portion of the hull shall remain upon the cob nor does he distinctly recommend the cutting off of the kernels in any manner. His recommendation is simply that the kernels be removed by any convenient and suitable method."

The same vice was held to destroy the patent in the *Permutit* case, 284 U. S. 52. The Court said (p. 60):

> "The statute [35 U. S. C. 33] requires the patentee not only to explain the principle of his apparatus and to describe it * * * but also to inform the public during the life of the patent of the limits of the monopoly asserted * * *. The free bed [which there was in question] was neither described in the specification nor claimed in either Claim 1 or Claim 5."

So in the present case. Neither the specification nor the claims make any disclosure of an arc "sheathed by a mantle" or of a conductive arc area "composed predominantly of vaporous welding composition" said by Linde, in opposing the allowance of the writs, to constitute the

"two unique features" of the invention. Indeed, the Court of Appeals expressly said (R. 1000):

> "None of these nine claims [i.e., process claims 5, 6, and 11 through 17] refer in any manner to the presence or absence of an arc, either directly or by reasonable inference."

How then can the patent possibly be sustained as valid if the novelty of the process, as earlier stated by the Court of Appeals, is to be found in the circumstance (R. 998) "that the electric *arc* present between the electrode and the base metal *is sheathed* by a mantle of molten welding composition * * *"?

Certainly a patent cannot stand where the inventors not only have not done what the statute, 35 U. S. C. 33, requires they do, "particularly point out and distinctly claim" their invention, but have, as the Court of Appeals said (R. 1000), "carefully avoided any commitment on that subject." In fine, as the Court put it in *O'Reilly v. Morse* (1853), 15 How. (56 U. S.) 62, 113, "he claims an exclusive right to use a manner and process which he has not described and indeed had not invented, and therefore could not describe when he obtained his patent."

But the process claims are invalid for yet another reason.

3. Where Novelty of Process Rests in Flux, Constituents Must Be Disclosed.

The "heart of the invention," the trial court held, is "the welding composition discovered by the inventors" (R. 915, 925, Finding 15). Otherwise the practice of the invention follows precisely that of Robinoff (R. 927, Finding 27).

Pointing out (R. 908), "The evidence is persuasive that no such basic difference in phenomena is present in the Jones, et al. method," as was urged by Linde to distinguish it from Robinoff, the court further found (R. 911):

"The distinctive characteristics * * * can be attributed only to the peculiar properties *of the welding composition* which is employed."

Accordingly, since the claims "make no reference to the chemical constituents of the welding composition" (R. 915), the trial court held them invalid under the statute, 35 U. S. C. 33 (R. 915).[23]

The Court of Appeals reversed. It did not reject the trial court's fact finding (R. 915) "that the welding composition * * * is the heart of the invention." It reversed on the point of law that it is (R. 999):

"unnecessary in a process claim to refer in any way to the chemical constituents of the composition where, as here, they are fully set forth in the specification."

The Court of Appeals was three times wrong. As the cases show, (1) it *is* necessary, and especially so in a process claim where the sole novelty resides in the composition used, to disclose and claim the constituents which contribute the novelty and constitute the discovery, (2) this

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[23] The trial court thus struck down process claims 1, 3, 4, 7, 8, 9 (R. 915). However, it should be noted that process claims 2, 5, 12, 15, and 16, which the trial court held invalid on other grounds, are subject to precisely the same frailty (see Appendix, p. 73). Still other process claims, 6, 11, 13, 14, 17, also held invalid on other grounds, while they make mention of the composition, do so in such general terms that they successfully avoid giving the public any real information about the claimed invention (R. 959-60). They do not "particularly" point out nor "distinctly" claim the purported discovery, as the statute requires, 35 U. S. C. 33. As in *General Electric Co. v. Wabash Appliance Corp.* (1938), 304 U. S. 364, 368, "The claim is invalid on its face. It fails to make a disclosure sufficiently definite to satisfy the requirements of R. S. § 4888, 35 U. S. C. § 33." The frailty is that "when his patent expires, the public must apply to him to learn what it is," *O'Reilly v. Morse* (1853), 15 How. (56 U. S.) 62, 113; *Brooks v. Fiske* (1853), 15 How. (56 U. S.) 212, 214-5; *Scott Paper Co. v. Marcalus Manufacturing Co., Inc.* (1945), 326 U. S. 249, 255. Indeed, the only claims which even purport to define any composition claimed to have been discovered with any degree of particularity, are process claim 10 and composition claims 28 and 29, none of which is charged as infringed (R. 17)

requirement, which flows from the statutory command, 35 U. S. C. 33, to "particularly point out and distinctly claim" the invention, is not satisfied, as the Court of Appeals thought, by referring the public to the specification, and (3) even if the specification otherwise were adequate to do the work of claims, the patent still would fail because the "constituents," which the Court of Appeals considered "fully set forth in the specification," include inoperable compounds and others old in the art. That the Court of Appeals was wrong is clear because:

—(a) Otherwise Patent, in Defiance of Statute, Covers Anything Producing Same Result.

The teaching of this Court's cases is that, where the identity of the elements which constitute the sole novelty of the invention is not disclosed, the patent is invalid. It is not enough to claim merely a "material" which will produce a "conductive melt." See claims 1, 3, 4, 7, 8, 9 (R. 958).[24] To sustain such claims, especially where that "material" is the "heart of the invention" (R. 915), would be to award a patent upon a result. This is denounced by:

Halliburton Oil Well Cementing Co. v. Walker (1946), 329 U. S. 1, 9-10, 12;

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[24] Claim 3, for example, which the Court of Appeals held valid, reads as follows (R. 958):

"The method of electric welding by melting a metal electrode, depositing the metal so melted upon a metal work piece, and coalescing said melted metal with adjacent fused metal of said work piece, which method comprises supplying heat for said welding by passing an electric current from said electrode to said work piece through a fused **nonmetallic material** *which acts as a high-resistance conductor* at welding temperatures and which does not evolve substantial amounts of gas when in contact with the melted weld metal, and maintaining said material in constant contact with said electrode and work piece to *avoid* the formation of a substantial air-conducted electric arc between the electrode and work piece."

General Electric Co. v. Wabash Appliance Corp. (1938), 304 U. S. 364, 368, 371, 374;

Holland Furniture Company v. Perkins Glue Company (1928), 277 U. S. 245, 256-8.

As this Court noted in the *Halliburton* case, 329 U. S. at page 12:

> "Just how many different devices there are of various kinds and characters which would serve * * * we do not know. * * * In this age of technological development there may be many other devices beyond our present information or indeed our imagination which will perform that function and yet fit these claims. And unless frightened from the course of experimentation by broad functional claims like these, inventive genius may evolve many more devices to accomplish the same purpose."

The reasons thus stated in *Halliburton* with respect to combination claims, should be applied with equal force to process claims. In the one as much as the other (p. 9) "the public and those affected by patents" need the protection of the statute. The Court should so declare.

—(b) Public Cannot Be Sent to Specification to Measure Monopoly Covered by Patent.

Whatever the force of the statute otherwise might be, the Court of Appeals thought it unnecessary to refer "in any way to the chemical constituents of the composition" which is the heart of the invention and its sole novelty (R. 999):

> "where, as here, they are fully set forth in the specification."

It will not do to say the composition is referred to in the specification. The reason is "He **cannot** go beyond what he claimed and insist that his patent covers something not claimed, merely because it is to be found in the descriptive part of the specification," *Railroad Company v.*

Mellon (1881), 104 U. S. 112, 118. Indeed, since "each claim must stand or fall, as *itself* sufficiently defining invention," as this Court held in *Altoona Publix Theatres, Inc. v. American Tri-Ergon Corp.* (1935), 294 U. S. 477, the claim cannot (p. 487) "be aided by reading into it parts • • • of other claims," let alone the specification.[25]

—(c) Where Usable Element Identifiable Only by Further Experiment, Patent Invalid.

But even if the Court of Appeals were right in pointing to the specification, that would not save the claims.

The reason is that the "chemical constituents" referred to in the specification are *not* all operable, as later (see pp. 65 to 66) will more fully be pointed out. The statute, 35 U. S. C. 33, is not satisfied by referring litigants and the public to the specification to find the usable elements by further experimentation. The statute requires that the inventor do more than "leave the person attempting to use the discovery to find it out 'by experiment,'" *Tyler v. Boston* (1868), 7 Wall. (74 U. S.) 327, 330; *Howard v. Detroit Stove Works* (1893), 150 U. S. 164, 167. The disclosure, to be valid, must be such "as would enable him to use the invention *without having to resort to experiments* of his own to discover those ingredients," *Beu v. Jeantet* (1889), 129 U. S. 683, 686; *The Incandescent Lamp Patent* (1895), 159 U. S. 465, 474.

The judgment of the District Court, holding invalid all of the process claims, should be reinstated to the end that there be restored to the public domain that which Linde has reclaimed therefrom.

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[25] To the same effect are: *Milcor Steel Co. v. George A. Fuller Co.* (1942), 316 U. S. 143, 145-6; *Marconi Wireless Telegraph Company of America v. United States* (1943), 320 U. S. 1, 23; *McClain v. Ortmayer* (1891), 141 U. S. 419, 423-4; *White v. Dunbar* (1886), 119 U. S. 47, 51-2.

II. FLUX CLAIMS OF PATENT NEITHER VALID NOR INFRINGED—AS WRITTEN THEY GO BEYOND INVENTION—AS INTERPRETED THEY EMBRACE PRIOR ART.

Of the flux claims in issue, the trial court held four, claims 18, 20, 22, 23, valid and infringed. The Court of Appeals affirmed. Claims 24, 26, 27, the trial court held invalid. The Court of Appeals reversed. Thus, all of the flux claims—except claims 19, 21, 25, 28, 29, which are not charged as infringed—have been sustained.

As will be seen, the flux claims are neither valid, nor infringed.

1. Flux Claims are Invalid on Face; Patentees Have Claimed too Much.

Aside from those not in issue, the flux claims fall into two groups:

1. Claims 24 and 26 which embrace, respectively, all "metallic silicates" and all "silicates";
2. Claims 18, 20, 22, 23, 27 which embrace all the "alkaline earth metal silicates."

These claims are invalid because (a) they are broader than the invention and therefore fail to satisfy the statute, 35 U. S. C. 33, and (b) if otherwise sufficiently certain to satisfy the statute, they re-claim the old with the new.

—(a) Claims Asserted Broader than Invention; Therefore They Fail to Satisfy Statute.

What the patentees sought was "an improved welding composition or flux" for use in the old Robinoff method (R. 912). "They discovered what they sought," said the trial court (R. 912), adding:

> "It is evident that the welding composition discovered by the inventors is the heart of the invention" (R. 915, 924, Finding 7, R. 927, Finding 27).

The flux they discovered consisted of calcium and magnesium silicate in specific proportions.[26] The patentees, having tried out various combinations of silicates (R. 38):

> "ultimately got down to calcium silicate, and then added a new component, a basic component, magnesium, and so we came up with a calcium magnesium silicate"

to which they added a small amount of calcium fluoride to lower the melting point.[27] "So we concluded," said Kennedy, one of the patentees (R. 39):

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[26] Whether even the calcium magnesium silicate flux the patentees discovered, and which is the limit of their contribution to the art, is patentable, is open to doubt. Although the patentees did not know it, because they were unacquainted with prior fluxes (R. 60), what the patentees did was to apply to welding, fluxes old in the analogous electric furnace art. Unwittingly they retraced a furrow already turned by others.

Heroult in his 1903 electric furnace patent No. 721,703 (Defts. Exh. 143, R. 720, 1329-30) disclosed the use of a flux composed chiefly of, "lime [calcium oxide], dolomite [calcium-magnesium carbonate], or oxid of iron liquefied by the addition of silica,"—i.e., calcium, magnesium, or iron silicate—or alternatively, of "a fusible silicate which has no chemical action on the bath" (p. 2, lines 32-6). For similar use Greene patent No. 1,532,052 (Defts. Exh. 143, R. 720, 1331) disclosed a flux consisting of lime (i.e., calcium oxide) and a substantial percentage of silica—in other words, calcium silicate (p. 1, lines 53-60).

Application, even unwitting, of these electric furnace fluxes to arc welding is the application of "an old process * * * to a new * * * use" which, as *Mandel Bros., Inc. v. Wallace*, No. 16, October Term, 1948, decided November 8, 1948, teaches, "is not invention."

It is unimportant that the patentees, unfamiliar with prior exploration (R. 60), supposed they had reached a virgin shore.

[27] The use of calcium fluoride for this purpose "is well known metallurgically" (R. 89). The patentees "did not claim to have first discovered the property" (R. 90). The purpose of lowering the melting point of the flux is to prevent the flux from solidifying before the molten steel (R. 59). If the flux freezes first, while the metal still is molten, gaseous inclusions in the steel (resulting, for example, from the reaction of the carbon in the steel and the oxygen in the air, which forms a gas, R. 459) will be trapped in the congealing metal (R. 59) and show up as a hole in the weld (R. 58). Additionally, if the flux hardens too quickly it will prevent the still molten metal from settling into a flat, smooth weld (R. 70, 170).

"that we had performed sufficient experiments on calcium magnesium silicate, to have a commercial and usable flux."

This calcium magnesium silicate flux the patentees defined specifically in claims 10, 28, 29 and generally in claims 19, 21, 25. These are not charged as infringed (R. 17). This is the flux they demonstrated to the trial court (Pltf. Exhs. 133A-B, R. 230, 107, 883). It is the flux which is the basis of respondent's "commercial success" (R. 925, Finding 9).

However, instead of confining their claims to their discovery, they laid claim also to *all* "silicates," *all* "metallic silicates," and *all* "alkaline earth metal silicates."[28] The claims so stated exceed the invention.

—Silicate Claims too Broad.

Claims 2, 24, 26, which monopolize the *whole class* of "silicates" and "metallic silicates," the trial court struck down as too broad (R. 918-9). The Court of Appeals reversed. It noted (R. 1001):

> "The District Court held process claim 2 and composition claims 24 and 26 invalid on the ground that a number of silicates have been shown to be inoperative. [The finding was "The evidence is clear and convincing that many silicates, even many metallic silicates, are inoperative" R. 918, 926, Finding 17.] The composition is described as a silicate in process claim 2, as a metallic silicate and calcium fluoride in composition claim 24, and as consisting chiefly of silicates in composition claim 26. It [the trial court] rejected plaintiff's [i.e., Linde's] contention that 'silicates' and 'metallic silicates,' when read in the light of the specifi-

[28] As Professor Walton Hamilton and Irene Till have observed, "Even if he [the inventor] knows how limited his contribution is, he has no incentive to erect modest barriers upon his own preserves. If he can secure title to more than he has created, so much the greater is his strategic hold upon the whole of a useful art." *What Is a Patent?* 13 LAW AND CONTEMPORARY PROBLEMS, Duke University, 245, 256.

cations, meant the nine metallic silicates which had been proved operative."

They had *not* been proved operative.[29]

But aside from this, invalidly broad claims cannot so be rewritten.[30] The trial court rightly refused to so amend these claims. It rejected (R. 918-9) respondent's argument that the "silicates" and "metallic silicates" of the claims here in question should be restricted to the nine metallic silicates mentioned in the specification. It relied on *Aluminum Co. of America v. Thompson Products, Inc.* (6 C. C. A., 1941), 122 F. (2d) 796. The Court of Appeals, while asserting its allegiance to the Sixth Circuit's decision, arrived at a conclusion in direct conflict with that case. In the *Aluminum Company* case the patent covered both a method of making castings of aluminum-silicon alloy and a product resulting from the practice of the method. The trial court held the absence of silicon limitations in the claims invalidated them. Touching the patentee's contention that the specifications disclosed the silicon content, and the claims, therefore, should be read in the light of the specifications, the Sixth Circuit held that rule (p. 798):

> "is in no event applicable where it appears to be clear that the inventor sought a broader monopoly than would seem to be justified by his invention as he has described it."

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[29] The proof is on pages 65-6.

[30] The breadth of the claims may be measured by the fact that silicates abound in nature. "Silica is a very large constituent of the earth's crust" (R. 304, 642). Furthermore, the language of the claims does not restrict the use of the composition thus so loosely defined as to include a large portion of the earth's crust; to electric welding in any particular manner; the claims cover such composition whether employed as a coating on the electrode, deposited as a layer on the seam to be welded, or in any other manner.

The court therefore, refused to "interpolate into the defeated claims * * * a limitation upon the silicon content of the patented alloy not there expressed" (p. 798).

Here, as in the *Aluminum* case, the patent contains claims both to the process and the composition which specifically define the constituents of the welding composition or flux. Petitioners, however, are not and could not be charged with infringement of those claims.[31] It is, therefore, evident on the face of the patent that the broader claims asserted against petitioners were deliberately included and should be stricken.

—Alkaline Earth Claims too Broad.

The "alkaline earth metal silicate" claims; 18, 20, 22, 23, 27, are likewise invalidly broad.[32]

By these claims respondent seeks a monopoly upon fluxes "containing a major proportion of alkaline earth metal silicate," that is, containing a major proportion of the silicates of calcium, or of magnesium, or of strontium, or of barium (R. 925, Finding 11). To sustain claims so broad would be like sustaining a patent on a loaf of bread "containing a major proportion of flour."

The patentees discovered a *specific* combination (claims 10, 28, 29); now they are given a patent on *every* flux, pro-

[31] Claims 10, 19, 21, 25, 28, 29 are not charged as infringed (R. 17).

[32] Claim 18 names a single ingredient, viz., "a major proportion of alkaline earth metal silicate." It patents (R. 960):

> "A composition for electric welding containing a major proportion of alkaline earth metal silicate, and being substantially free from uncombined iron oxide and from substances capable of evolving gases under welding conditions."

Claims 20, 22, 23 include but one additional ingredient, in unnamed proportion, namely "a fluoride" or "calcium fluoride." This has had a long use in fluxes to lower the melting point (R. 89-90). It is in the same category as the "salt and pepper to taste" of the conventional recipe.

The remaining claim, 27, in addition to "alkaline earth metal silicates," designates "1% to 8% alumina." This is found as an impurity in the ingredients used (R. 86-7, 323-4, 655, 837).

vided only one of these four silicates is there in "major proportion." Their notes show (Defts. Exh. 88, R. 425, 1153) they used only two of these in "major proportion," namely, calcium silicate and magnesium silicate, and that of these, many combinations were unsatisfactory. Their notes show unsatisfactory results with calcium silicate alone, unsatisfactory results with magnesium silicate when used in major proportion, and unsatisfactory results with more than three dozen fluxes using calcium silicate in major proportion, combined with minor proportions of iron or sodium silicates (Defts. Exh. 88, R. 425, 1153). It was only when "we ultimately got down to" (R. 38) the specific combination defined in claims not charged as infringed that they produced "a commercial and usable flux" (R. 39).

What the public will have under these claims, when the patent expires, is a ticket of admission to a laboratory to find by experiment *which* of these combinations "containing a major proportion of alkaline earth metal silicate" produces a "usable flux." The public will not even have the patentees' notebook as a guide, except as part of the record in this case (Defts. Exh. 88, R. 425, 1153). It will be for the public to apply to the custodian of the notebook, or to the inventors, to discover the invention. The statute requires the inventor to "particularly" point out and "distinctly" claim the invention, 35 U. S. C. 33; what the patentees have done instead is to pose a problem for experiment.

—(b) If Statute Otherwise Met, Flux Claims Invalid Because they Reclaim Prior Art.

If, however, these claims, 18, 20, 22, 23, 27, and 24, 26, despite their sweeping breadth, satisfy the statute, they then are invalid because they patent prior art. They do not, as they must if they are to be valid, distinguish from "all that is the previous art, all that as yet has not been found out, all that is not the invention." 13 Law and Con-

TEMPORARY PROBLEMS, Duke University, 245, 249, *What Is a Patent?* by Walton Hamilton and Irene Till.

Specifically, if claims (18, 20, 22, 23, 27) to a flux "containing a major proportion of alkaline earth metal silicate" are valid, then the expired electric furnace patents of Heroult and Greene (see p. 52, note 26) which cover fluxes utilizing an "alkaline earth metal silicate," namely, calcium and magnesium silicates, are no longer public property.

Similarly, if claims to "silicates" generally (claim 26), and to "metallic silicates" (claim 24), read as the Court of Appeals read them, are valid, then numerous expired silicate and metallic silicate patents (see pp. 8-9, note 3) belong to Union Carbide and its subsidiary Linde, and not to the public.

The claims are invalid. They should be stricken.

But, even if valid, they cannot properly be read as infringed, as next will be pointed out.

2. Flux Claims Not Infringed; Court Has Misread Specification, Then Converted It Into Claim.

The four flux claims, 18, 20, 22, 23, sustained by the trial court and affirmed by the Court of Appeals, monopolize fluxes:

> "containing a major proportion of alkaline earth metal silicate" (R. 960).

These claims[33] have been held valid and infringed by the Lincolnweld manganese silicate flux which admittedly is *not* an alkaline earth metal silicate (R. 919-20, 925.

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[33] Composition claim 27 (R. 960) also calls for "alkaline earth metal silicates", with the addition of 1% to 8% alumina, forming a composition "conductive when molten." The trial court held this claim invalid on the ground it rests upon the nonexistent "conductive melt" phenomenon (R. 917-8, 915). This is enough to dispose of that claim, but, as will be seen, that which destroys the other "alkaline earth metal silicate" claims likewise brands this claim as invalid.

Finding 12). Although the Lincolnweld flux, as found by the trial court (R. 920), "*does not literally infringe*," it is condemned as an equivalent.

Why?

Because the inventors in the specification stated—so the court below thought—that manganese silicate was one of the nine they had found "more or less efficacious" (R. 956, col. 1, line 70, R. 916, 993-4).

This is the language of the specification—it is on this that infringement of the flux claims is predicated:

> "We have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel and aluminum, both in binary and ternary combinations, in various proportions. * * * While a number of these * * * are more or less efficacious in our process, we prefer to use silicates of the alkaline earth metals, such as calcium silicate, and we also prefer to add to these silicates minor proportions of alumina and of a substance adapted to lower the melting point, for example, a halide salt" (R. 956, col. 1, lines 62-75, R. 916, 993-4, 1001).

As has been seen (pp. 25-6), the specification does *not* say the patentees had used, and found "more or less efficacious," *each* of these nine as a major constituent. It says they had used "calcium silicate *and*" one or two of the others—that is, in "binary and ternary combinations" (R. 648-9)—and in various proportions.

The court's reconstruction of the specification—on the basis of which a sweeping patent has been sustained—thus begins in a misreading of its language. It assumes the patentees had used *each* of the nine in the "major proportion" called for whereas the specification and the patentees' record of experiments show the contrary.[34]

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[34] The patent expressly *limits* the use of manganese silicate to "moderate amounts." (Appendix, p. 72). The experimental notes show calcium silicate and magnesium silicate are the only

(Continued on following page)

However, be that as it may, accepting the court's reading, the patent still fails. It fails because if so read (a) the manganese silicate here in question does not fall within the grant, or, if it does, then (b) the necessary effect of so reading the patent is to expand it into invalidity.

—(a) Patent Excludes Manganese Silicate as Major Constituent in Flux Claims.

Assuming that the patent says the inventors had found manganese silicate and the other eight "more or less efficacious," the hard fact, which no amount of argument can change, is that the patentees not only declared (R. 956, col. 1, lines 71-2):

"we prefer to use silicates of the alkaline earth metals"

thus **excluding** manganese which is not an alkaline earth metal silicate, but, coming to state their claims, explicitly and unambiguously *limited* the claims of the invention to fluxes containing (R. 960, claims 18, 20, 22, 23, 27):

"a major proportion of alkaline earth metal silicate * * *"

The manganese silicate of the Lincolnweld flux—because it is not an alkaline earth metal silicate—was thus put outside the scope of the patent. Not having been *claimed*, even if otherwise within the discovery, it "is presumed * * * abandoned * * * to the public." *McClain v. Ortmayer* (1891), 141 U. S. 419, 424. Lincoln's manganese silicate, therefore, cannot be an infringing flux.

However, it now has been written into the patent. The result is to subject to Linde's monopoly much that is public property.

(Continued from preceding page)

alkaline earth metal silicates the patentees tried. They tried 40 different fluxes in which calcium silicate was the principal ingredient, combined with silicates of one or two of the following: sodium, iron, magnesium, aluminum and manganese. Nearly all were unsatisfactory (Defts' Exh. 88; R. 425, 1153)."

—(b) Effect Is to Expand Patent to Embrace Compositions Covered by Prior Patents.

The manganese silicate, which Lincoln used and which the patentees *excluded* from their claims, could not have been included therein because Miller patent No. 1,754,566, already both claimed and taught the use of "manganese silicate" as a flux (Defts. Exh. 145, R. 720, 969, 971, col. 1, lines 32-6).

The trial court thought Miller did not anticipate the alkaline earth metal silicate claims of the patent in suit—thus expanded to cover manganese silicate—because Miller did not teach prefused manganese silicate as the "preferred form of the invention." Miller, said the trial court, "did not teach all that the Jones, et al. patent does" (R. 920-1). The trial court pointed out that the Miller patent says (R. 921):

> "*Instead of* preformed [that is, prefused] manganese silicate the coating may contain material adapted to react at the temperature of the metal-depositing operation to produce manganese silicate. This is the preferred form of the invention *as it permits one operation to be dispensed with.*"

Thus, Miller discloses the use of prefused manganese silicate and only recommends a mixture of ingredients dispensing with one operation. Manifestly, the *disclosure* of a patent, for the purpose of its anticipatory effect, is not limited to the preferences stated therein.

Clearly, prefusion of flux ingredients was not new with Jones. Even before Miller patent No. 1,754,566, above cited, prefusion was taught in earlier patents, all now expired and all of which were in the prior art before the present patentees came upon the scene. Thus:

> Miller patent No. 1,741,031 (Defts. Exh. 145, R. 720, 1346, 1347), taught "The flux should be substantially non volatile . . the welding temperature and

furthermore should *not* evolve such quantities of gases, as by decomposition of its constituents or reaction among them, that the flux puffs or froths away from the surface of the molten metal. • • •

I have found that the above requirements are met in admirable fashion by a flux consisting of a borosilicate glass [i.e., a metallic silicate], such as sodium glass. • • • The borosilicate glasses when *in the fused state* undergo relatively slight change in fluidity throughout a wide temperature range, and this property is one of the principal causes of their effectiveness when used as welding fluxes. • • •

If a preformed [that is, prefused] glass is used it *evolves no gases* upon heating, while if the glass is formed *in situ* the reacting materials can be such that gases are not evolved" (R. 1347, lines 38-78).

Miller patent No. 1,748,785 (Defts. Exh. 145, R. 720, 1346, 1349), also taught prefusion of the ingredients. It called for prefused boro-silicate glass with the addition of a fluoride. (R. 1349, lines 45-54). The patent taught preparation of the flux "*by fusing together*" specified materials "preferably in a finely divided form and thoroughly mixed before fusion. The fusion of the two substances is desirably continued until a homogeneous melt results" (R. 1349, lines 47-53).

Armor patent No. 1,467,825 (Defts. Exh. 145, R. 720, 1346), disclosed an arc welding composition which included a large percentage of clay, i.e., aluminum silicate, and a substantial amount of manganese oxide. It taught prefusion of the ingredients. They "are preferably fused together and then pulverized" (R. 1346, col. 2, lines 58-9).

Vervaet patent No. 720,300 (Defts. Exh. 146, R. 720), relating to a process of manufacturing welding compounds, taught prefusion of the flux ingredients. To effect this the ingredients "are placed, according to the preferred manner of following my method, in a crucible together and then heated to a degree of temperature which, being above that of the melting-point of the glass [i.e., sodium-boro-silicate glass, a metallic silicate], is sufficient to reduce both to the molten condition [thus fusing the ingredients]" (lines 23-78).

Whitcomb patent No. 277,393 (Defts. Exh. 142, R. 720, 1325), relating to a flux composed largely of fluorspar, a naturally occurring calcium fluoride; taught the addition of certain materials to "prevent the generation of deleterious gases" (R. 1325), col. 1, lines 29-30) and pointed out that "if * * * the water of crystallization be driven off [which can be effected only by fusing the material], the compound is adapted to be used in the usual manner, by placing it on the parts to be brazed or welded in the manner usually employed with other substances now used for like purposes"[35] (R. 1325, lines 31-8).

Of this prior art the patentees knew nothing. "I never had heard of the Miller patent" (R. 76); "we know nothing whatever about electric welding fluxes" (R. 60).

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[35] Vervaet and Whitcomb, to be sure, related to forge welding rather than electric arc welding. However, the application of an old principle to new uses is not invention. "It is immaterial that his structure for using the method was neither the best possible nor as skilfully designed or used as that later employed by Smith." *Smith v. Hall* (1937), 301 U. S. 216, 232; *DeForest Radio Co. v. General Electric Co.* (1931), 283 U. S. 664, 683-4; *Mandel Bros., Inc. v. Wallace*, No. 16, October Term, 1948, decided November 8, 1948.

The law, however, unsparingly charges the inventor with knowledge of the past. "He has no claim to the prior art, to any antecedent scientific discovery, to any bit of technology which lies to right or left," 13 LAW AND CONTEMPORARY PROBLEMS, Duke University, 245, 256, "*What Is a Patent?*" by Walton Hamilton and Irene Till.

--(c) Claims Measure Grant—May Not Be Enlarged by Resort to Specifications.

Obviously the patent could not issue on manganese silicate flux, prefused or not. But, whether it could or not, the point is that, having expressly and unambigously limited the claims to "alkaline earth metal silicates"—of which manganese silicate is not one—respondent cannot now be heard to ask that manganese silicate be read into the grant. It is the "*claims*, not the specifications" which measure the grant. *Milcor Steel Co. v. George A. Fuller Co.* (1942), 316 U. S. 143, 145. The specifications, the Court warned, in *Marconi Wireless Telegraph Company of America v. United States* (1943), 320 U. S. 1, are not to be read (p. 23) "as though they were claims whose function is to exclude from the patent all that is not specifically claimed." As the Court put it, in *McClain v. Ortmayer* (1891), 141 U. S. 419, 423:

> "While the patentee may have been unfortunate in the language he has chosen to express his actual invention, and may have been entitled to a broader claim, we are not at liberty * * * to construe such claims to include more than their language fairly imports. Nothing is better settled in the law of patents than that the patentee may claim the whole or only a part of his invention, and that if he only describe and claim a part, *he is presumed to have abandoned the residue to the public.* The object * * * is not only to secure to him all to which he is entitled, but to apprise the public of what is still open to them. The claim is the measure of his right to relief, and while the specification may be re-

ferred to to limit the claim, it can **never** be made available to expand it."[36]

But that is precisely what the court below has done. To find infringement, it has reached to the specification to enlarge the grant.

The result is that the Miller patent on manganese silicate flux, now expired, is swept into the orbit of Jones. And so is the unpatented Robinoff flux, because it is primarily aluminum silicate, one of the nine along with manganese silicate, now written into the patent. If manganese silicate may be culled from the specification and read into the grant, so must Robinoff's aluminum silicate. **Thus, these two fluxes, which by law are public property, are made to pay tribute to Linde.**

That is not all.

—(d) Claims, If So Enlarged, Invalid as Embracing Inoperable Compounds.

Had the patentees laid claim to manganese silicate as a flux, prefused or otherwise (or to Robinoff's aluminum silicate, which stands on the same footing), such claims obviously would have had to be disallowed.

Now note what the court below has done. These manganese silicate fluxes which could not have been allowed if affirmatively claimed, the court has written into the patent claims. This the court says it has done on the doctrine

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[36] The rule that the claim is the measure of the grant has been rigorously applied by this Court. See, for example: *Keystone Bridge Company v. Phoenix Iron Company* (1877), 95 U. S. 274, 278-9; *White v. Dunbar* (1886), 119 U. S. 47, 51-2; *Altoona Publix Theatres, Inc. v. American Tri-Ergon Corp.* (1935), 294 U. S. 477, 487; *Railroad Company v. Mellon* (1881), 104 U. S. 112, 118; *Western Electric Manufacturing Company v. Ansonia Brass & Copper Company* (1885), 114 U. S. 447, 452-3; *Yale Lock Manufacturing Company v. Greenleaf* (1886), 117 U. S. 554, 559; *Permutit Co. v. Graver Corporation* (1931), 284 U. S. 52, 60; *Universal Oil Products Co. v. Globe Oil & Refining Co.* (1944), 322 U. S. 471, 484

of equivalents (R. 919-20). What the patentees could not directly claim, the court has vested in them indirectly.

The doctrine of equivalents has been misapplied. Carried to its unavoidable conclusion, the court's doctrine will sweep into the patent monopoly, as it has here, much that is public property.

Whatever may be the proper scope of the rule of equivalents, it never should be permitted to convert a specification into a claim. Otherwise the scope of the patent of the future will differ much from that of the past. So profound would be the consequences of such a doctrine, that no court should give it sanction. If the statute, 35 U. S. C. 33, which requires the inventor to "particularly point out and distinctly *claim*" his invention, is to be changed, that is the proper work of Congress.

Moreover, if specifications are to do duty as claims, they obviously must be measured by the same tests as apply to claims. So measured, they are invalid because they embrace inoperable compounds.

The sole basis for the court's decision on the flux claims is, it will be recalled, the statement in the specification that:

> "We have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel and aluminum, both in binary and ternary combinations" (R. 956, col. 1, lines 62-5, R. 916, 920, 993-4, 1001).

Any of these nine silicates, including the manganese silicate of the Lincolnweld flux, under the court's decision may be read in place of the (R. 960):

"major proportion of an alkaline earth metal silicate"

called for in the claims. But, when so used in "major proportion":

> Iron silicate, one of the nine, will not produce a satisfactory weld. The "results obtained with iron-bearing silicates have not been satisfactory," the

inventors told the Patent Office (Pltf. Exh. 126, R. 26, 1074, 1078, second application). Their notes (Defts. Exh. 88, test No. 299, R. 1153, 1231) show it to be "perfectly no good."

Magnesium silicate, likewise one of the nine, the inventors' notes show produced welds "lousy with holes" (Defts. Exh. 88, test No. 349, R. 1153, 1243).

Sodium silicate, also one of the nine, the patentees' notes show (Defts. Exh. 88, test No. 340, R. 1153, 1241) "gives round holes."

This reading of the patent, adopted by the court below, is moreover denied by the patent itself. Note that:

Aluminum silicate, one of the nine, the patent says must not be used in the "major proportion" called for by the court's interpretation. Indeed, the same paragraph of the specification relied upon by the court below calls for only "*minor* proportions of alumina" (R. 956, col. 1, lines 73-4) and, in claims 10 and 26 through 29, the alumina content is expressly limited to not more than 8% (R. 959, 960).

Manganese silicate, which Lincoln used, the patent says, "may be added in *moderate* amounts" (R. 956, col. 2, line 33, see appendix, p. 72). This "moderate" amount the court's reading transposes into "a major proportion."

Surely a doctrine which (1) has the effect of sweeping into the patent grant compositions covered by prior patent, (2) calls for the use of silicates which are not operable, and (3) can be applied only by doing violence to express claims, cannot stand.

The patentees, having discovered one compound—a specific flux defined in claims not charged as infringed—are not entitled to have their patent expanded to find infringement in the use of that which lies in

the public domain. "We think it proper to reiterate our disapprobation of these ingenious attempts to expand a simple invention * * * into an all-embracing claim, calculated by its wide generalization and ambiguous language to discourage further invention in the same department of industry and to cover antecedent inventions.", *Carlton v. Bokee* (1873), 17 Wall. (84 U. S.) 463, 471-2.

III. THE WHOLE HAS BEEN IMPLEMENTED BY UNLAWFUL TYING AGREEMENTS.

Respondent Linde has misused the patent in violation of Section 3 of the Clayton Act, 15 U. S. C. 14.

The statute makes it unlawful to "make a sale or contract" relating to patented or unpatented articles:

> "on the condition, agreement, or undertaking that the lessee or purchaser thereof shall not use * * * commodities of a competitor"

where the effect may be to substantially lessen competition or tend to create a monopoly.

Immediately following the acquisition of the patent in suit, respondent, backed by the power and prestige of its parent, Union Carbide and Carbon Corporation, began and has continued to exploit the patent by an elaborate system of licenses running to 750 users (Pltf. Exhs. 215, 216A to S, R. 400, 401, 1137, 395). Coupled with such licenses, respondent also regularly entered into contracts covering the licensee's entire requirements for unpatented metal electrodes used in the patented process. (Pltf. Exhs. 218, 218A to G, R. 404, 1145, 400-7, 412, 420-1). The trial court held this was not unlawful (R. 921-2, 927, Finding 28). The Court of Appeals affirmed (R. 1003).

Had the license and the electrode contract, obligating the purchaser to buy his "entire requirements" of unpatented electrodes from Linde, been expressed in one instrument, instead of two, the result would manifestly have been unlawful. It could not survive *International Salt Co.*,

Inc. v. United States (1947), 332 U. S. 392. Here the same result is achieved through the device of two contracts. Putting the two together—as they admittedly were (R. 921) in 10% of the cases, despite the studied effort to give them the appearance of separate and unrelated transactions—the result is that once the customer has accepted a license and signed the electrode contract, there is established an agreement that he will not thereafter use the commodities of a competitor. Clearly this is the effect despite respondent's efforts to put a different light upon it (R. 421). With control of the entire field of deep flux welding once secure by patent, Linde's monopoly—through the use of simultaneous "entire requirements" contracts—is thus expanded into a monopoly of the business of supplying to users of the process the unpatented electrodes used therein.

Here, as in *Morton Salt Co. v. G. S. Suppiger Co.* (1942), 314 U. S. 488, 490:

> "The question we must decide is not necessarily whether respondent has violated the Clayton Act, but whether a court of equity will lend its aid to protect the patent monopoly when respondent is using it as the effective means of restraining competition with its sale of an unpatented article."

IV. DECISION OF COURT OF APPEALS IS RESULT OF MISCARRIAGE IN REVIEW PROCEDURE—UNREVERSED FINDINGS HAVE BEEN DISPLACED BY MISTAKEN RULES OF LAW.

The Court of Appeals did not reject any of the fact findings on which the trial court condemned the bulk of the patent. It substituted for these unreversed findings mistaken rules of law. On the other hand, the trial court's rulings on law the reviewing court treated as substantially unreviewable, by reading them as though they were findings of fact.

Thus, the Court of Appeals reversed the usual process of review. What it did was to dispose of the case by:

1. *Ignoring unreversed findings* of fact that:
   (a) All the procedural steps taught by the patent are old;
   (b) The only novelty presented is the use, in an old process, of a different welding compound;
   (c) The "conductive melt" phenomenon, relied upon to distinguish from the prior art, does not exist.
2. *Substituting for the unreversed findings* the erroneous legal conclusions that:
   (a) The sheathed arc, abandoned by the patentees, may be restored to the patent grant;
   (b) Invalidly broad claims may be rewritten by resort to the specifications;
   (c) A patent, issued because it disclaimed the arc as the heating medium, may be sustained on the ground that it does utilize the arc.
3. *Treating as unreviewable* findings of fact, which "we may not disturb," the trial court's reading of the patent grant, which is a pure question of law.

By this process the court reached an otherwise unreachable result.

Even if the ignored findings were doubtful and the conclusions of law treated as facts debatable, revision of an approach so erroneous would be called for. But here more is involved. The findings ignored are so firmly embedded in record facts that as a matter of law the court could not disturb them. No reasonable mind could differ. Anyone who sees Robinoff alongside Jones will see that the procedural steps are the same, as the trial court found. There is no room for difference. This being so, the finding that the only novelty is in the welding composition is unassailable. The record is overwhelmingly convincing that the "conductive melt" process does not exist, as the trial court

found. Such is the quality of the findings the court through error ignored.

CONCLUSION.

In the manner above detailed, large areas of well-tilled public domain have been reclaimed by Linde.

The judgments should be reversed with instructions to declare the patent neither valid nor infringed.

Respectfully submitted,

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December 9, 1948.

APPENDIX.

EXCERPTS FROM SPECIFICATION DESCRIBING CONDUCTIVE MELT PROCESS OF PATENT IN SUIT.

Among the various ways in which electrical energy has been converted into heat for the welding of metals, **the arc process** (which itself takes several forms) **is the one most generally practiced.** (R. 955, Col. 1, ll. 2-6.)

A further object is to overcome the difficulties which, in prior processes, are caused by the inherent instability of an electric arc, its liability to be extinguished by a variety of adventitious causes, and the difficulty, especially in automatic machines, of reestablishing the arc when it has been extinguished. (R. 956, Col. 1, ll. 9-15.)

We have discovered a novel process for electric welding **wherein the necessary heat is generated by** the passage of a heavy electric current between a metal electrode (usually bare) and the metal plates or similar objects to be welded, the electrode being out of mechanical contact with the objects and **the current being carried across the gap** between the electrode and the objects **by and through a conductive melt or welding composition having appropriate electrical resistance properties.** The heat thus generated melts successive portions of the electrode and the molten material is deposited as weld filler material. The welding composition serves as an active instrumentality, or welding medium, inasmuch as **it provides heating means,** (R. 956, Col. 1, ll. 20-35.)

The composition of the welding medium is of the utmost importance. (R. 956, Col. 1, ll. 55-56.)

Since the composition is **nonconductive when cold,** a conductive path for the welding current is provided by bridging the gap between the electrode and the work with, for example, a sliver of graphite or a wad of steel wool. The power is then applied, the welding composition **is locally heated until it fuses and becomes conductive, forming a subsurface pool,** and immediately thereafter the end of the electrode begins to fuse and the molten metal begins to deposit in the groove, displacing the subsurface pool of fused welding composition. (R. 957, Col. 1, l. 67—Col. 2, l. 3.)

The relatively high current densities which are preferably used superheat the molten metal and welding composition, making them highly fluid. **The liquid currents set up in this highly fluid mass** effectively mix the metal and welding composition, thereby cleansing or washing impurities out of the metal, and then completely separate the metal as it is deposited. (R. 958, Col. 1, ll. 27-34.)

Several circumstances show clearly that **our process does not depend on the formation of an arc of the usual type.** If, while a weld is being made, the circuit is opened externally of the weld and then closed again **while the resistive composition is still molten,** the current will immediately resume its flow without any necessity for moving the electrode into contact with the seam as it would be necessary to do to reestablish an arc of the usual type. **The heat for melting the electrode is evidently developed in the conductive melt itself.** (R. 958, Col. 1, ll. 42-53.)

The conductive welding composition used in our process doubtless performs the protective functions of a flux, but it is much more than a flux, and many compositions which are satisfactory **fluxes for arc welding are unsuitable for our purpose.** (R. 958, Col. 1, ll. 54-59.)

EXCERPTS FROM SPECIFICATION DESCRIBING WELDING COMPOSITION OF PATENT IN SUIT.

We have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel and aluminum, **both in binary and ternary combinations,** in various proportions. We have also used calcium titanate and various titano-silicates, these being used when it is desired to introduce titanium into the weld metal. While a number of these conductive welding compositions **are more or less efficacious in our process, we prefer to use silicates of the alkaline earth metals, such as calcium silicate,** and we also prefer to add to these silicates minor proportions of alumina and of a substance adapted to lower the melting point, for example, a halide salt. (R. 956, Col. 1, ll. 62-75.)

More specifically, the welding composition preferably comprises, as its principal ingredients, silica (SiO_2), at least one basic constituent consisting of an alkaline earth such as lime (CaO) or magnesia (MgO) or a mixture thereof, and alumina (Al_2O_3). The silica and basic consfituent are in approximately the proportions theoretically required to form metasilicates, although a substantial excess of silica is permissible and frequently advisable. (R. 956, Col. 2, ll. 1-10.)

The basic constituent preferably consists chiefly of lime and magnesia in approximately the proportions of three parts of CaO to one part of MgO, by weight; but other proportions are useful and within the invention. Basic materials other than lime or magnesia, for example **oxides of manganese,** titanium, or the alkali metals, and known fluxing agents such as borax or boric acid, **may be added in moderate amounts** without greatly changing the essential characteristics of the welding composition. (R. 956, Col. 2, ll. 25-35.)

It is possible, and may at times be desirable, to include in the welding composition materials which are transferred to the weld filler material during the welding operation and appear in and modify the properties of the completed weld, for example: ferromanganese, ferrosilicon, ferrochromium, calcium molybdate, carbon, or reducible chemical compounds thereof.

In a specific instance, we fused together 50 pounds of calcium carbonate, 9.4 pounds of magnesium oxide, and 40.5 pounds of silica until the reaction was complete. The materials used were of the purest quality used in the ceramic industries, but the fused product showed the presence, on analysis, of about 5% alumina. The fused material was cooled and granulated, and to each pound, one ounce of fluorspar was added. The material was then ready for use to form the conductive melt which is the principal feature of our process.

Welding compositions which have been used successfully and which serve as representative examples within the invention **have the following analyses,** by weight:

	I	II	III	IV
Percent CaO	29.5	31.24	29.18	40.12
Percent MgO	8.7	11.01	8.26	0.89
Percent SiO_2	56.4	52.40	57.48	52.94
Percent Al_2O_3	5.4	4.11	4.86	5.80
Percent Fe_2O_3	Low	0.13	0.24	0.23

(R. 956, Col. 2, ll. 43-75.)

EXCERPTS FROM CLAIMS.

(R. 558-60)

CLAIM 1.

* * * establishing between said member and said electrode a **conductive path of a high-resistance melt** * * * passing through said melt an electric current of sufficient strength to **maintain its conductivity** * * *.

CLAIM 2.

* * * which method comprises supplying heat for said welding by passing an electric current * * * substantially wholly **through a pool of silicate fused in situ, without the formation of any substantial gas-conducted electric arc.**

CLAIM 3.

* * * passing an electric current * * * **through a fused nonmetallic material which acts as a high-resistance conductor** * * *.

CLAIM 4.

* * * **passing an electric current** * * * **through a pool of nonmetallic material fused in situ** * * * which acts as a **high-resistance conductor at welding temperatures.**

CLAIM 5.

* * * establishing between said member and said electrode **a conductive path of a high-resistance melt of fusible silicate,** * * * **passing through said melt** an electric current of sufficient magnitude to maintain the conductivity * * *.

CLAIMS 6, 12, 14, 15, 16 and 17.

* * * establishing between and in contact with said member and said electrode **a conductive melt** * * * and **passing through said melt an electric current** of sufficient magnitude to **maintain the conductivity** * * *.

CLAIM 7.

* * * **filling the gap** between said electrode and said member **with** a finely-divided, unbonded, nonmetallic **material which is fusible at welding** temperatures; * * * **fusing** a portion of **said material in said gap** to render the material electrically conductive; * * * passing through the **circuit comprising said electrode, fused material, and work piece** an electric current * * * and to **maintain a pool** of said nonmetallic material in contact with said electrode.

CLAIM 8.

* * * **maintain a localized subsurface pool of said material fused** * * * deposit of sufficient metal therefrom to **displace said pool** * * *.

CLAIM 9.

* * * **bridging** the fusing end of said electrode and the adjacent fused local area of the work **with a pool of material fused in situ** without substantial gas evolution, **said fused material being electrically conductive** * * *.

CLAIM 11.

11. A process of electric welding which comprises the step of forming a **conductive high-resistance melt** * * * and passing an electric current through a **circuit comprising said melt** and said metal part.

CLAIM 13.

* * * **establishing between and in contact with said member and said electrode a conductive path of high-resistance melt** * * * and passing along said conductive path an electric current of sufficient magnitude to **maintain the conductivity**

CLAIM 26.

26. An electric welding composition which is **conductive when molten,** consists **chiefly of silicates,** and contains about 1% to 8% alumina.

CLAIM 27.

27. A prefused electric welding **composition which is conductive when molten** and the principal constituents of which are alkaline earth metal silicates * * *.